United States Court of Appeals

for the Second Circuit

APPENDIX

74-2455

IN THE UNITED STATES COURT OF APPEALS

SECOND CIRCUIT

B

RAPHAEL J. COSTANZO,
Plaintiff-Appellant

vs.

Appeal Docket No.
74-2455

STANLEY ARRON,
VISA THERM PRODUCTS, INC.,
ANNA ARRON, AND ANNA ARRON
EXECUTRIX OF ESTATE OF MAX
ARRON,
Defendants-Appellees.

APPEAL FROM THE UNITED STATES
DISTRICT COURT FOR THE DISTRICT
OF CONNECTICUT.

Honorable Thomas F. Murphy
(non-jury)

JOINT APPENDIX OF EXHIBITS

Arthur T. Fattibene,
Attorney for Plaintiff -
Appellant
2480 Post Road
Fairfield, Connecticut

To: Edward Kunin, Esq.
Attorney for Defendants-Appellees
285 Golden Hill Street
Bridgeport, Connecticut

Ernest Junkins, Esq.
Attorney for Defendants-Appellees
855 Main Street
Bridgeport, Connecticut

UNITED STATES COURT OF APPEALS
FILED
APR 16 1975
SECOND CIRCUIT

9

PAGINATION AS IN ORIGINAL COPY

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References noted by Trial Court in its Opinion.

		Pages
Winchell U.S. Patent	3,079,486	199 - 201
Williams U.S. Patent	1,703,583	202 - 203
Theodore U.S. Patent	3,010,007	204 - 206
Carrona U.S. Patent	3,084,241	207 - 213
Jacobsen U.S. Patent	2,329,766	214 - 221
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British Patent	546,812	231 - 236
Cordless Power Publication by Robert McCarthy		237 - 240
Taylor Patent	2,287,915	241 - 252

Costanzo Foreign Patents corresponding to His U.S. Sock Patent 3,293,405 in suit and Marked for Identification Only:

Costanzo Canadian Patent	796,850	253 - 262
Costanzo British Patent	1,128,224	263 - 265
Costanzo Japanese Patent	42-19636	266 - 267
Costanzo Swiss Patent	472,847	268 - 271
Costanzo French Patent	1,501,533	272 - 276
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PX-1

Dec. 20, 1966 R. J. COSTANZO 3,293,405

ELECTRICALLY HEATED FOOTWEAR

Filed Sept. 13, 1965

Fig. 1

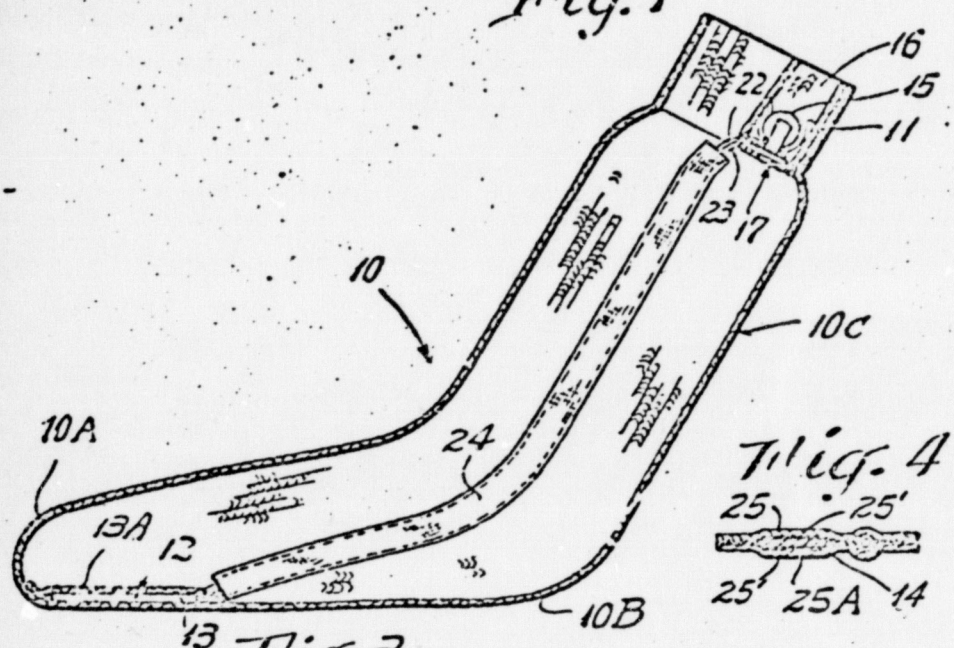


Fig. 4

Fig. 3

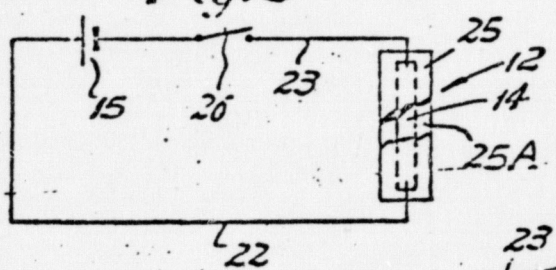
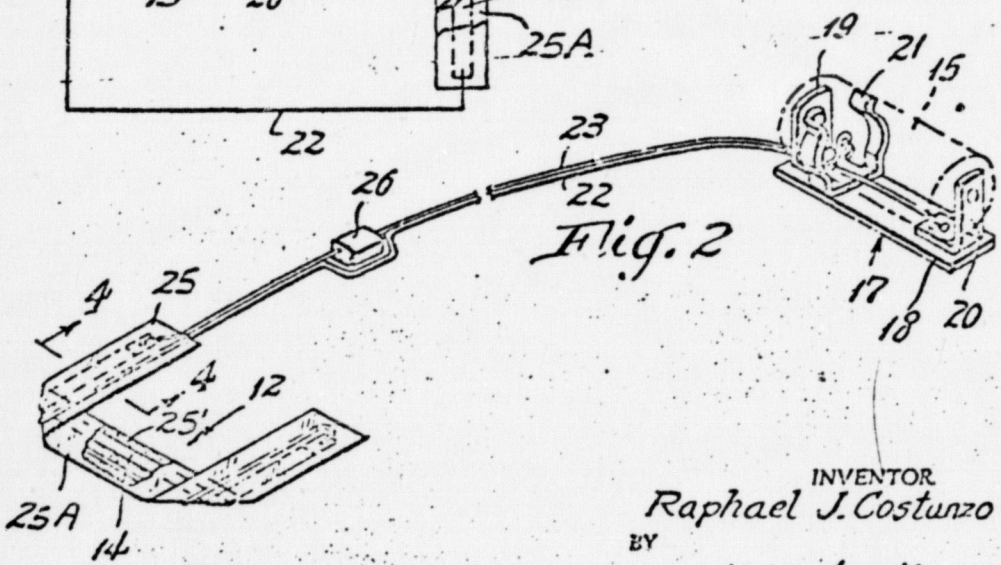


Fig. 2



INVENTOR
Raphael J. Costanzo
BY
Arthur J. Fattibene
ATTORNEY

United States Patent Office

3,293,405

Patented Dec. 20, 1966

3,293,405

ELECTRICALLY HEATED FOOTWEAR

Raphael J. Costanzo, 119 Park St.,
Bridgeport, Conn. 06608

Filed Sept. 13, 1965, Ser. No. 487,011
4 Claims. (Cl. 219—211)

This invention relates in general to an electrically heated footwear, and more specifically to an electrically heated sock having a circuit including an electric power source and electric heater operatively connected thereto wholly contained within the sock.

Considerable efforts have been made to attain a highly efficient electrically heated footwear as for example, a sock to keep one's feet warm. Heretofore all the known efforts to electrically heat such a sock required a source of electrical power which was extraneous or remotely disposed from the sock itself, e.g., a fixed source, such as household or vehicle power, or a portable power pack carried on the person's body. When the line current from a fixed source of electrical power was utilized, e.g. in a home or vehicle, the mobility of the person wearing such heated sock or footwear was necessarily limited to the length of cord or wire required for conducting the current from the fixed power source to the sock. Consequently, such socks had only limited application, as for example when sleeping, resting or when flying an airplane or operating some other vehicle wherein movement of the wearer was necessarily confined and where sufficient power was available to energize the heater of such socks.

To obviate the mobility handicap of such electrically heated footwear socks, efforts have been made to provide a portable power pack by which the heater of such socks or footwear may be energized. Because of the energy heretofore required to energize the heater used in such socks, such efforts resulted in utilizing a relatively large sized battery or power pack which had to be worn by the wearer about his waist. For this reason long conductors or wires were required to extend along the body of the wearer to connect the power pack to the heating means disposed within the sock or footwear. Such power packs, however, due to the size requirements of the battery necessary to energize such heaters, were relatively bulky, heavy and cumbersome to wear. Also, the wires required to extend from the power pack and the sock greatly interferred with the mobility of the person wearing such sock and associated power pack unit.

It is, therefore, an object of this invention to provide a heated footwear, sock or the like with an improved type electrical heating means capable of operating on very low voltages, whereby the power source to energize the same comprises a small, low voltage battery which can be concealed wholly within the footwear or sock itself.

Another object of this invention is to provide an improved heated sock which is completely immersible in water and consequently can be either machine or hand-washed with ease and without adversely affecting the electrical portion of the sock.

Another object of this invention is to provide a heated sock which is long lasting and non-allergic to the wearer.

Another object of this invention is to provide an improved heated sock in which the distribution of heat can be located where most desirable.

Another object of this invention is to provide a heated sock which is relatively simple in construction, inexpensive to fabricate, and which is positive in operation.

Another object of this invention is to provide a heated footwear or sock having an improved heater construction.

Another object of this invention is to provide an electrically heated sock having an entirely self-contained source of electrical energy and heater energized thereby.

Another object of this invention is to provide in an electrically heated wear a circuit including a low voltage, battery and connected heater with provisions for conserving the useful like of the battery to its maximum extent.

The foregoing objects and other features and advantages are attained by an electrically energized footwear as for example, a sock which may be of conventional construction, i.e. it may be either woven or knitted, and comprising essentially of a toe portion, a heel portion and a connected leg portion with the usual elastic top or band adjacent the upper end thereof. In accordance with this invention an electrical heating means is located within the sock. The heating means is preferably located adjacent to toe portion of the sock and it is energized entirely by a low voltage battery which is also carried within the sock itself. Accordingly, a means is located adjacent to the upper end or band of the sock to define a pocket for containing a holder to which a small low voltage battery is detachably secured. In the toe portion of the footwear there is formed a pocket for receiving the heating means. In accordance with this invention the heating means comprises an electrical resistor form of a flat strip of high electrical resistant material, as for example Nichrome. The resistor is operatively connected in circuit to the battery by means of conductors which run along the inside of the sock. To enhance the heating characteristic of the heating means, a radiating surface is operatively connected to the electrical resistor in heat transfer relationship. The radiation surface comprises flat metallic sheet material or foil which is electrically insulated but in an heat conducting relationship with the electrical resistor. Accordingly, the arrangement is such that the heating means can be shaped to conform to any desired shape. By utilizing a flat element added comfort is attained to the wearer of such footwear.

To conserve the useful life of the battery, a circuit breaking means is interposed in the circuit between the heating means and the battery, which in effect operates as a thermostat, intermittently breaking and making the circuit, as determined by the power requirements thereof.

A feature of this invention resides in an electrically heated footwear or sock having a self-contained electrical power source and heating means operatively connected thereto.

Another feature of this invention resides in electrically heated sock which is readily washable.

Another feature of this invention resides in the provision of utilizing the heater construction which includes an electrical resistor with connected heat radiating surfaces so as to expand the heating area of the heater.

Another feature of this invention resides in the provision of an improved heating element which can be energized by a very low voltage battery.

Another feature of this invention resides in the provision of an improved electrically heated sock or the like which can be worn with all the comfort and convenience of ordinary sock or footwear.

Other features and advantages will become more readily apparent when considered in view of the description and drawings in which:

FIGURE 1 illustrates a sectional side view of a sock construction embodying the instant invention.

FIGURE 2 illustrates a prospective view of the improved electrical heater and source of power necessary to energize the same, as utilized in the sock construction of FIGURE 1.

FIGURE 3 is a schematic illustration of the electrical circuit utilized in the sock construction of FIGURE 1.

FIGURE 4 is a sectional view of the heating means taken along line 4—4 on FIGURE 2.

Referring to the drawings there is shown therein an improved footwear construction 10 embodying the instant invention, which is herein illustrated as a sock. The sock 10 may be conventionally formed, i.e. woven or knitted, and comprises generally of a toe portion 10A, a heel portion 10B, and a connected leg portion 10C having an elastic band 11 or the like adjacent the upper end thereof.

In accordance with this invention the sock 10 is electrically heated by means of a low voltage heating means 12 suitably positioned within the sock 10. In the illustrated form of the invention, the heating means 12 is located adjacent the toe portion 10A of the sock. To accommodate the heating means 12 within the sock there is formed an internal pocket 13 in the toe portion 10A.

The heating means 12 as best seen in FIGURE 2 is readily inserted into the pocket 13 which is defined by the sole or bottom portion of the sock and a layer of material 13A which is sewn adjacent thereto on the inside surface of the sock. The heating means 12 comprises a flat strip of electrical resistance material 14, as for example Nichrome. The Nichrome strip or resistor 14 in turn is connected in circuit with a suitable source of electrical power as for example, a low voltage battery 15 which is adapted to be carried in the sock 10 itself.

In the illustrated form of the invention the battery 15 is carried in the pocket 16 formed in the upper end of the sock; and preferably in the band portion 11 thereof. The size of the pocket 16 is such that it can readily accommodate the battery holder 17 and a small low voltage battery 15 for energizing the heater 12 as will be hereinafter described. The holder 17 is constructed so that the battery can releasably attach thereto.

As best seen in FIGURE 2, the battery holder 17 comprises a base member 18 which has connected thereto a pair of spring finger or terminals 19, 20 which are arranged to engage with the terminal portions of the battery 15. Connected to or integrally formed with the front finger or terminal 19, is a resilient clip 21 which serves to embrace the side portions of the battery 15 as shown. Accordingly, the battery 15 can be readily releasably attached to the holder 17 by positioning the same between the terminal fingers 19, 20 and associated clip 21. Accordingly the battery is frictionally retained against longitudinal movement by means of the spring finger terminals 19, 20, and against lateral movement by the spring clip portion 21.

Suitable conductors 22, 23 connect the battery into circuit with the heater 12. Accordingly the ends of one conductor 23 are connected between the Nichrome strip 14 and the battery terminal 20. The other conduit or wire 23 is connected to the other battery terminal 19 and the other end of the Nichrome strip 14. With the resistors so connected, it is placed in circuit with the battery when the battery is placed in the holder 17. A suitable binding 24 conceals or covers the conductors 22, 23 against the leg portion of the sock.

The heating surface of the Nichrome strip 14 is enhanced by radiation means connected in heat transfer relationship therewith. In the illustrated form of the invention, the heat radiating means comprises a sheet of heat conducting material, as for example, metallic foil 25, such as aluminum foil or the like which is connected in heat transfer relationship to the Nichrome strip 14. In the illustrated embodiment, two similar strips 25, 25A may be disposed in back to back relationship on either side of the resistant element so as to be secured thereto in heat transfer relationship with it and each other. A suitable means for securing the foil to the resistor 14 may be by appiying an adhesive coating 25' to the back of the foil. Accordingly the adhesive coating 25' also functions to electrically insulate the electrical resistor from the foil

while at the same time securing the foil 25, 25A in heat transfer relationship to the resistor 14. The foil 25, 25A may be also electrically insulated by anodizing the foil.

As shown, the heating area or surface of the resistor 14 can be expanded to any desired width or shape depending upon the shape and form of the radiating strips 25, 25A. Thus, with a very narrow resistor, the heat therefrom can be effectively distributed over a relatively large area. Consequently the heat generated is not confined to a single point, but is comfortably distributed for uniform heating.

In the illustrated form of the invention it will be readily noted that the heating means 12 was initially formed as an elongated member which was subsequently folded to define the U-shape heater 12 which is readily inserted into the toe pocket 13 of the sock 10.

In operation, it will be noted that whenever the battery 15 is interposed between the terminals 19, 20 of the battery holder, the circuit to the heater will become energized.

If desired, a suitable switching means (not shown) may be connected in series between the battery 15 and the heating element 12 so as to control the operation of the circuit.

In accordance with this invention a means is provided for extending the life of the battery. Experience has shown that the temperature required to be generated by the heater need be only slightly greater than that of normal body temperature to keep one's feet warm. For this reason the power requirement to energize the heater need not be constant. For this reason the heater circuit can be intermittently operated, as may be required by the body temperature or demand of the wearer. This is attained by interposing an automatically operating circuit breaker 26 of known construction in the line between the battery 15 and the heater. Accordingly the circuit breaker is constructed so that it will function as a thermostat for intermittently making and breaking the circuit to the heater according to the power requirements. Accordingly by utilizing intermittent operation, it has been discovered that the useful life of the battery 15 can be substantially extended.

The heating means 12 described is arranged and constructed to operate with very low voltage battery. For example, three to four 1½ volt batteries may be utilized to energize the heater, or a 3 volt battery can satisfactorily energize the heater 12. Also 2 D cell batteries can be used to energize the heater 12.

From the foregoing it will be readily noted that the heated footwear 10 described comprises a wholly contained unit in which the source of power 15 and the heater 12 can be wholly disposed within the makeup of the sock 10 itself. The entire sock 10 is relatively light in weight and which when worn can be worn with the convenience and luxury of an ordinary sock. Consequently, the wearer is not required to wear any bulky power pack unit which is rendered readily apparent to another person. With the invention described, the footwear is given all the appearance and has all the comfort of a conventional footwear, but with the added provision that a source of heat is provided to add additional comfort in extreme cold. Accordingly, the heated sock has particular application as sport wear, e.g. hunting and/or fishing in the cold, or cold climates, and can be worn so as to not interfere in any manner with the movements of the wearer. Also, the overall weight thereof is reduced to a minimum.

While the instant invention has been particularly defined as applied to an electrically heated sock it will be readily noted that the novel heating means may be readily applicable to other body heating garments and/or applications. Therefore, while the instant invention is disclosed and described with reference to a heated sock, it will be readily understood and appreciated that variations and modifications may be made without departing from the spirit or scope of the invention.

What is claimed is:

1. In combination:

(a) a woven sock having a toe portion, a heel portion and a connected leg portion,

(b) means defining a pocket adjacent the upper end of said leg portion,

(c) a holder adapted to releasably secure a low voltage battery in said pocket,

(d) electrical non-conductive means defining a pocket in the toe portion of said sock,

(e) a heater disposed in said toe pocket,

(f) said heater including a flat resistor strip of electrical resistance material,

(g) radiation means connected in heat transfer relationship to said flat resistor strip for defining an expanded radiation surface for said heater,

(h) said radiation means including a pair of heat conducting sheets of material for sandwiching said resistor strip in heat transfer relationship therebetween,

(i) means joining said heat conducting strips together and electrically insulating said strips from said resistor strip,

(j) electrical conductors connecting said resistor strip in circuit to said battery,

(k) means for maintaining said conductors against the leg portion of said sock,

(l) and a circuit breaker connected in circuit with said heater to intermittently make and break the circuit.

2. In combination

(a) a woven sock having a toe portion, a heel portion and a connected leg portion,

(b) means defining a pocket adjacent the upper end of said leg portion adapted to receive a low voltage battery of less than 6 volts,

(c) electrical non-conductive means defining a pocket in the toe portion of said sock,

(d) a heater disposed in said toe pocket,

(e) said heater including a flat resistor strip of electrical resistance material,

(f) radiation means connected in heat transfer relationship to said flat resistor strip for defining an expanded radiation surface for said heater,

(g) said radiation means including a pair of heat conducting sheets of material for sandwiching said resistor strip in heat transfer relationship therebetween,

(h) means joining said heat conducting strips together and electrically insulating said strips from said resistor strip,

(i) electrical conductors connecting said resistor strip in circuit to said battery, and

(j) means maintaining said conductors against the leg portion of said sock.

3. The invention as defined in claim 2 wherein said heat conducting sheets of material comprise metallic foil connected in heat transfer relationship to said resistor strip.

4. The invention as defined in claim 2 wherein said means joining said heat conducting strips comprises an adhesive coating on one side of said heat conducting strips whereby said heat conducting strips of material are adhesively secured in back to back relationship to sandwich said resistor strip therebetween in heat transfer relationship therewith.

References Cited by the Examiner

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1,558,278	10/1925	Phillips	219—472 X
1,702,583	2/1929	Williams	219—211
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3,084,241	4/1963	Carrona	219—211

FOREIGN PATENTS

116,344	12/1942	Australia.
546,812	7/1942	Great Britain.

RICHARD M. WOOD, *Primary Examiner.*

V. Y. MAYEWSKY, *Assistant Examiner.*

10 Om. Respond

#5

Applicant: Raphael J. Costanzo

Serial No: 487,011

Filed: September 13, 1961 Group 210

For: ELECTRICALLY HEATED FOOTWEAR

New York, New York
February 15, 1966

Hon. Commissioner of Patents

Washington 25, D. C.

Dear Sir:

PETITION TO MAKE SPECIAL

Now comes the petitioner, Raphael J. Costanzo, the applicant of the above identified application and prays that this application be made special and that in support thereof submits his affidavit, together with the affidavit of Mr. Benjamin Hines, President of Timely Products Corporation, and the affidavit of Arthur T. Fattibene, attorney of record for the applicant.

Raphael J. Costanzo

Dated this 16th day of February, 1966.

20

Applicant: Raphael J. Costanzo

Serial No: 487,011

Filed: September 13, 1965 Group 210

For: ELECTRICALLY HEATED FOOTWEAR

STATE OF CONNECTICUT)
) ss. Bridgeport,
COUNTY OF FAIRFIELD)

The petition of Raphael J. Costanzo, Applicant of the above identified patent application, and herein referred to as the Petitioner, being duly sworn, depose and says that:

1. The Petitioner is the Applicant and inventor of the subject matter covered by the above identified patent application and that he resides at 119 Park Street, Bridgeport, Connecticut.

2. The Petitioner has granted an exclusive license to manufacture, use and sell the invention covered by the above identified application to Timely Products Corporation, having a place of business located at 546 Old Academy Road, Fairfield, Connecticut.

Raphael J. Costanzo

Raphael J. Costanzo

Sworn to before me this 17th day of February, 1966.

Notary Public

(SEAL)

Applicant: Raphael J. Costanzo

Serial No: 487,011

Filed: September 13, 1965

For: ELECTRICALLY HEATED FOOTWEAR Group 210

STATE OF CONNECTICUT)
) ss. Bridgeport
COUNTY OF FAIRFIELD)

AFFIDAVIT OF BENJAMIN M. HINES,
PRESIDENT - TIMELY PRODUCTS CORPORATION

I, Benjamin M. Hines, being duly sworn, depose and says:

1. That I am President of Timely Products Corporation, and that Timely Products Corporation maintains an office located at 546 Old Academy Road, Fairfield, Connecticut.

2. That Timely Products Corporation is a corporation duly organized under the laws of the State of Connecticut.

3. That by an agreement dated December 27, 1965, Timely Products Corporation has acquired from Raphael J. Costanzo, Applicant of the above identified patent application, an exclusive license to manufacture, use and/or sell electrically heated footwear as specified in the above identified patent application.

4. That the Timely Products Corporation has available for its use sufficient manufacturing facilities located at 305 Railroad Avenue, Bridgeport, Connecticut for manufacturing and assembling the electrically heated footwear of the above identified patent application, and that there is located at said address a good deal of presently available equipment such as sewing machines of various types, plastic forming and working equipment,

packaging and box forming equipment and various other bench tools and supplies for effecting the manufacture and assembly of electrically heated footwear of the above identified patent application, and that Timely Products Corporation expects to make an initial investment of $30,000.00 to $60,000.00 if claims are allowed to protect this investment.

5. That Timely Products Corporation will not manufacture the electrically heated footwear of the above identified patent application in quantity, and will not increase its present manufacture, unless it is certain that a patent will be granted.

6. That Timely Products Corporation obligates itself to manufacture the invention in quantity in the United States and/or its possession immediately upon the allowance of claims which will protect the investment.

7. The Board of Directors of said Timely Products Corporation has authorized me to make this affidavit and thereby to obligate said Timely Products Corporation to manufacture the invention in question in quantity immediately upon the allowance of claims that will protect the investment.

8. That if the application is allowed, the undersigned will furnish a statement under oath (not to be made of record in this case) within three (3) months of such allowance showing;

(a) how much money has been expended in the manufacture of the aforesaid electrically heated footwear.

(b) The number of such electrically heated footwear devices manufactured.

(c) The extent to which such manufacture has effected the employment of labor.

TIMELY PRODUCTS CORPORATION

By: Benjamin M. Hines
Benjamin M. Hines, President

- 8 -

Sworn to before me this 19 day of February , 1

Notary Public

My Commission Expires

(SEAL)

FEB 23 1966
U.S. PATENT OFF

Applicant: Raphael J. Costanzo

Serial No: 487,011

Filed: September 13, 1965

For: ELECTRICALLY HEATED FOOTWEAR Group 210

STATE OF CONNECTICUT)
) ss. Bridgeport,
COUNTY OF FAIRFIELD)

AFFIDAVIT OF ARTHUR T. FATTIBENE

I, Arthur T. Fattibene, being duly sworn, depose and say:

1. That I am a registered Patent Attorney, Registration No. 17,804, and a member of the Bar of the State of Connecticut.

2. That I am the attorney of record in the above identified patent application for which a Petition to Make Special has been requested.

3. That I had made a careful and thorough search of the prior art, and have noted that the most pertinent art relating to the invention in question are the following U. S. Patent: 969,147; 990,205; 1,918,276; 2,028,347; 2,584,302; 2,692,326; 2,882,463; 2,890,461; 2,945,115; 3,084,241.

4. That I believe all of the claims in the above identified application to be allowable over the most pertinent and relevant known art.

5. That I hereby aver that I will make every effort to see that a sworn statement is filed in compliance with the pledge of the co-petitioner Timely Products Corporation to file a statement under oath within three (3) months after the application is

allowed.

Arthur T. Fattibene
Attorney for Applicant

Sworn to before me this 19th day of February, 19

Notary Public

(SEAL)

UNITED STATES GOVERNMENT

Memorandum

U.S. DEPARTMENT OF COMMERCE
PATENT OFFICE

#-3

TO : Examiner, Group 210

DATE: March 2, 1966

FROM : First Assistant Commissioner

SUBJECT: Petition to Make Special

Respective manufacture
OK Tinel
3/14/66
d+P

Applicant: Raphael J. Costanzo

Serial No.: 487,011

The examiner will please send the file of the above identified application to the office of the First Assistant Commissioner, Room 3898, indicating hereon when the application will be reached for action.

If an amendment or other paper is attached, it should be entered before the file is forwarded.

J

This application will be acted upon Mar. 1967

March 2, 1966
Date of report

Richard Mr. Ward
Signature of person reporting



BUY U.S. SAVINGS BONDS REGULARLY ON THE PAYROLL SAVINGS PLAN

FORM PO-626 (9-25-64)

USCOMM-DC 7420-P64

MAILED
MAR 7 1966
COMMISSIONER'S OFFICE

U.S. DEPARTMENT OF COMMERCE
PATENT OFFICE
WASHINGTON

March 4, 1966

Ex parte Raphael J. Costanzo :
Serial No. 487,011 : On Petition To Make Special
Filed September 13, 1965 :
Electrically Heated Footwear :

The petition to make this case special has been considered.

If the examiner can make this case special without prejudice to any possible interfering applications, and he should make a rigid search for such, he is authorized to do so for the next action. Should the application be rejected, the case will not be considered special for the subsequent action unless the applicant promptly makes a bona fide effort to place the case in condition for allowance even if it is necessary to have an interview with the examiner to accomplish this purpose.

If the examiner finds any interfering application for the same subject matter, he should consider such application simultaneously with this case and should state in the official letter of such application that he is taking it out of its turn because of a possible interference.

Should an appeal be taken in this case or should this case become involved in interference, consideration of the appeal and the interference will be expedited by all Patent Office officials concerned, contingent likewise upon diligent prosecution by the applicant.

The petition is granted to the extent indicated.

Edwin L. Reynolds
First Assistant Commissioner

Arthur T. Fattibene
485 Lexington Avenue
Suite 2610
New York, New York 10017

28

USCOMM-DC 7419-P64

POL-280 (9-25-64)

Applicant: Raphael J. Costanzo

Serial No: 487,011

Filed: September 13, 1965

For: ELECTRICALLY HEATED FOOTWEAR Group 210

New York, New York
February 17, 1966

Hon. Commissioner of Patents

Washington 25, D. C.

Sir:

Preliminary to any Office Action and in support of the applicant's Petition to make the above identified patent application Special on the grounds of perspective manufacture, filed concurrently herewith, please amend the application as follows:

In the Claims:

Claim 1, last line, before the "." insert --, said heater including a low voltage electrical resistor, and a heat radiating means connected to said resistor in heat conducting transfer relationship thereto to define an expanded radiation surface for uniformally distributing the heat of said resistor when energized over an expanded area.--

Cancel Claim 2.

Cancel Claim 5 in favor of Claim 6.

Claim 6, line 6, after "carried" delete "directly on" and insert --immediately adjacent to--

line 10, after "heat" insert --conducting--

line 11, after "to" delete "expand the" and insert --define an expanded radiation surface for uniformally distributing the heat of the energized resistor over a greater area.--

Delete the last line.

Claim 8, line 2, after "material" insert --connected to an--

Claim 9, after "conducting" insert --strips--

Claim 10, line 4, change "insulates" to read --insulating--

Claim 12, line 11, after "of" delete "bight"

line 14, after "flat" insert --resistor--

line 17, after "sheets" insert --of material--

same line, after "resistor" insert --strip--

line 21, after "resistor" insert --strip--

Claim 13, line 12, after "a" insert --flat--

same line, before the "," insert --strip--

line 14, after "resistor" insert --strip--

line 15, before "means" delete "radiation"

line 16, after "resistor" insert --strip--

line 17, after "thereof" insert --by conduction--

line 18, after "said" delete "foil" and insert --conducting means--

line 19, before the "." insert --strip--

Claim 14, line 15, before "means" delete "radiation" and insert --heat conducting--

same line, after "means" insert --directly--

line 17, change "radiation" to read --heat conducting--

Cancel Claim 15.

Claim 17, last line, before the "." insert --, said heater including a low voltage electrical resistor element disposed in the foot portion of said sock, a means connected in heat conducting transfer relationship to said resistor element to define an expanded heat radiating surface, means for electrically insulat-

ing said radiating means from said resistor element, and means for supporting said source of electrical energy about the leg portion of the wearer.--

Cancel Claims 18 and 19.

R E M A R K S

Consideration of the application is requested.

Claims 1, 3, 4, 6 through 14, 16 and 17 are now the only claims retained in the application.

The above amendments are proposed in view of a search of the art made in support of applicant's Petition to Make Special, which is filed concurrently herewith.

The search was conducted by Frank Maley, a professional searcher; and the search was extended to Class 219, subs 211 and 527; Class 2, sub 239; Class 36, sub 2.6 and Class 28, subs 411, 283 and 284. Accordingly, the following references have been noted as being the most relevant art known to the applicant:

U. S. Patents, Nos. 969,147; 990,206; 1,918,272; 2,028,347; 2,584,302, 2,602,326; 2,082,468; 2,890,461; 2,945,115; 3,084,241.

The claims in the application have been reviewed and where appropriate have been amended so as to patentably distinguish applicant's invention over the known existing art.

In considering the claims now in issue, it is to be noted that each is directed to a foot warming device or sock which includes a low voltage electrical resistor which is connected in circuit to a low voltage source of electrical energy which is carried directly on the sock and which resistor includes means in the form of an expanded sheet of radiating material which is

connected in direct conducting heat transfer relationship to low voltage resistor element so as to define an expanded radiation surface for uniformally distributing the heat of the resistor element when the same is energized over a greater area. Accordingly, with the applicant's invention, it is to be noted the construction thereof does not impede in any manner the mobility of a person wearing the heated sock of the instant invention, nor is the wearer encumbered by utilizing a power pack which must be strapped about his body and which must be connected by wires extending down his leg as evidenced by the patent to Charles 930,206 or Crowell 2,692,326. Also, another important consideration which the Examiner is urged to bear in mind in determining the patentability of the claims in issue is that the low voltage heater in conjunction with the radiating surface connected in heat conducting relationship thereto is constructed and arranged so as to effect a more uniform distribution of the heat over a greater surface area of the sock so as to attain maximum utilization of the heat generated by a relatively narrow strip of resistor element. Consequently, the important contribution of the applicant's invention over that of the prior art, resides in the construction of an electrically energized or heated footwear which in any way will not hinder the mobility of the wearer, and which will more effectively utilize and distribute the heat generated to the foot portion of the sock.

Clearly the references are completely lacking in the concept defined in each of the claims in issue. It is to be noted that the Charles reference which has been noted 969,147, does not remotely suggest the applicant's concept of utilizing radiation

surfaces to expand the heated area of the sock.

In considering the applicant's invention, it is important that the Examiner bear in mind that the length of resistor element is of necessity is required to be limited in view of the low voltage source of electrical power required to generate the heat, and accordingly in order to effectively utilize the heat generated by such limited resistor element, applicant has utilized a sheet of radiating material connected in heat conducting relationship thereto to to expand the heating area thereof. Accordingly, the applicant has achieved a low voltage powered heater which will effectively heat a substantial portion of the foot portion of a sock.

In viewing the construction of Charles, it is rendered apparent that it is not capable of operating on any such low voltage source of electrical energy as is now set forth by the applicant's invention. Consequently, Charles both structurally and functionally cannot possibly anticipate patentability of the applicant's claimed invention.

Crowell does not disclose the electrical heating means and cooperating radiation means as applied to the sock in the manner set forth in each of the claims. Crowell expressly states that transverse openings 21 are required so as to function as hot air vents so that the heat may pass upwardly through the inner sole 15 and lining 16. Crowell expressly states: 'Since there are no other openings in the inner sole 15 nor in the bottom sole 17, the heat is thus concentrated upwardly through these openings." Accordingly, it is to be noted that Crowell does not utilize the applicant's arrangement of uniformally distributing the heat over an expanded area of the footwear. In the Crowell construction and as is expressly stated therein, it will be noted that

the heat is concentrated up through the openings 21 and consequently are not uniformally distributed in the manner contemplated by the applicant's structure. Also, it is to be noted that Crowell is further distinguished over the applicant's construction in a relatively large power pack is required to be strapped about the waist of the wearer and which are required to be connected by relatively long conductors 35 which extend down the legs of the wearer. Accordingly, a wearer's mobility is handicapped to this extent in that other garments, as for example the wearer's trouser must be encumbered by wires to effect the shoes of Crowell operative.

The Charles reference is noted, and the Examiner is urged to note that this reference requires an AC source of power. Consequently, the wearer's mobility must necessarily be restricted to the length of the cord necessary to connect the garment to an AC outlet. Accordingly, applicant's construction has been specifically conceived to obviate any such limitation in the movement of the wearer. Accordingly, it is contended that applicant's structure is clearly patentable thereover.

The patent to Pelosi likewise is not considered as negating patentability of the claims now in the application for the same reason as Crowell. Pelosi, like Crowell, is directed to a heated shoe or boot in which the inner sole 13 is perforated as at 14 in order to effect liberation of the heat therethrough.

The reference to Lillard is also directed to an arrangement for conducting electricity to an electrically heated slip insole worn inside a person's shoe. It will become readily apparent that the structure and mode of operation of the Lillard construc-

tion is radically distinct from that which the applicant is h... in claiming.

The references to Stein, Carrona, Hartman, Pupier and We... are each directed to radically distinct types of garments cha... that which is being herein claimed, and accordingly, it is co... ed that applicant's construction is clearly patentably define... over any of these references.

Accordingly, as each of the claims now in the application ... structurally distinguished over any of the applied references, whether considered singly and/or in combination, and as it is no... rendered readily apparent how the references may be modified in the absence of the applicant's own invention to negate the subj... matter of the claims in question, it is contended that each cla... is patentably distinguished over the closest known art.

In view of the foregoing amendments and remarks, reconsider... tion of the application is requested and a prompt Notice of an Allowance is earnestly solicited.

Respectfully Submitted,

Attorney for Applicant

-20-

ing said radiating means from said resistor element, and means for supporting said source of electrical energy about the leg portion of the wearer.--

Cancel Claims 18 and 19.

R E M A R K S

Consideration of the application is requested.

Claims 1, 3, 4, 6 through 14, 16 and 17 are now the only claims retained in the application.

The above amendments are proposed in view of a search of the art made in support of applicant's Petition to Make Special, which is filed concurrently herewith.

The search was conducted by Frank Maley, a professional searcher; and the search was extended to Class 219, subs 211 and 527; Class 2, sub 239; Class 36, sub 2.6 and Class 28, subs 411, 283 and 284. Accordingly, the following references have been noted as being the most relevant art known to the applicant:

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The claims in the application have been reviewed and where appropriate have been amended so as to patentably distinguish applicant's invention over the known existing art.

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connected in direct conducting heat transfer relationship to the low voltage resistor element so as to define an expanded radiation surface for uniformally distributing the heat of the resistor element when the same is energized over a greater area. Accordingly, with the applicant's invention, it is to be noted the construction thereof does not impede in any manner the mobility of a person wearing the heated sock of the instant invention, nor is the wearer encumbered by utilizing a power pack which must be strapped about his body and which must be connected by wires extending down his leg as evidenced by the patent to Charles 990,206 or Crowell 2,692,326. Also, another important consideration which the Examiner is urged to bear in mind in determining the patentability of the claims in issue is that the low voltage heater in conjunction with the radiating surface connected in heat conducting relationship thereto is constructed and arranged so as to effect a more uniform distribution of the heat over a greater surface area of the sock so as to attain maximum utilization of the heat generated by a relatively narrow strip of resistor element. Consequently, the important contribution of the applicant's invention over that of the prior art, resides in the construction of an electrically energized or heated footwear which in any way will not hinder the mobility of the wearer, and which will more effectively utilize and distribute the heat generated to the foot portion of the sock.

Clearly the references are completely lacking in the concept defined in each of the claims in issue. It is to be noted that the Charles reference which has been noted 969,147, does not remotely suggest the applicant's concept of utilizing radiation

surfaces to expand the heated area of the sock.

In considering the applicant's invention, it is important that the Examiner bear in mind that the length of resistor element of necessity is required to be limited in view of the low voltage source of electrical power required to generate the heat, and accordingly in order to effectively utilize the heat generated by such limited resistor element, applicant has utilized a sheet of radiating material connected in heat conducting relationship thereto to expand the heating area thereof. Accordingly, the applicant has achieved a low voltage powered heater which will effectively heat a substantial portion of the foot portion of a sock.

In viewing the construction of Charles, it is rendered apparent that it is not capable of operating on any such low voltage source of electrical energy as is now set forth by the applicant's invention. Consequently, Charles both structurally and functionally cannot possibly anticipate patentability of the applicant's claimed invention.

Crowell does not disclose the electrical heating means and cooperating radiation means as applied to the sock in the manner set forth in each of the claims. Crowell expressly states that transverse openings 21 are required so as to function as hot air vents so that the heat may pass upwardly through the inner sole 15 and lining 16. Crowell expressly states: "Since there are no other openings in the inner sole 15 nor in the bottom sole 17, the heat is thus concentrated upwardly through these openings." Accordingly, it is to be noted that Crowell does not utilize the applicant's arrangement of uniformally distributing the heat over an expanded area of the footwear. In the Crowell construction and as is expressly stated therein, it will be noted that

R E M A R K S

Reconsideration of the application is requested. Claims 12, 20, 21 and 22 are now the only claims retained in the application.

Applicant wishes to thank the Examiner for the interview granted to applicant's counsel on May 17, 1966.

At the interview, it will be recalled that the Office Action dated April 4, 1966 was discussed in detail as to the claims presented herein.

Of the claims now in the application, Claim 12 was originally objected to on formal grounds only. These objections were discussed, and it was agreed that the amendments thereto, as indicated above, would obviate the objections, and that the Claim 12 would therefore be allowed.

New Claim 20 was also discussed in detail, and it will be recalled that it was also agreed that it too would be deemed patentable over the applied art.

It was further agreed that a reasonable number of dependant claims would also be considered allowable, if rendered dependant upon any of the indicated allowed claims.

In view of the agreement reached, applicant has presented herein two additional claims, each rendered dependant upon allowable Claim 20. Consequently, Claims 21 and 22 are deemed to be in condition for allowance for the same reasons dictating the patentability of Claim 20.

In urging patentability of the claims agreed upon, it was stressed that the subject matter of each was directed to a novel low voltage, electrically heated sock having an electrical heater

connected in circuit to a low voltage battery carried in a pocket adjacent the upper end of the sock, wherein the heater comprises a radiation means connected in heat transfer relationship to the resistor strip to provide an expanded radiation surface that uniformally distributes the heat of the resistor element over a greater heat conducting area. Thus, it was urged that with the applicant's structure, maximum utilization of the generated heat was taken advantage of, and consequently the applicant has been able to achieve a genuinely low voltage heated sock. It was further pointed out that the art of record did not disclose applicant's structure nor was the applicant's structure remotely suggested therein. In reviewing the prior art, it was stressed that Theodore, one of the basic references applied, did not disclose the applicant's claimed combination. This patent is directed to an electrically heated blanket having a construction distinct from the subject matter of the claims in issue.

The reference to Winchell likewise was not considered as disclosing the specific sock construction to which the claims in question are now directed.

The secondary references of Jacobson, Marick or the British Patent also fail to negate the concept embodied in each of the claims herein. In Jacobson, the heater comprises an insulated wire woven into the tape. Obviously, this structure differs radically from the heater of applicant's claimed combination.

Both Marick and the British Specification 546,812 disclose a radically distinct type of heater construction for use in garments. As is expressly set forth in each of these references,

the heater is composed of a woven fabric having deposited thereon sufficient amounts of current conductive rubber composition to render the same capable of conducting an electrical current. Clearly, neither one of these patents utilizes the applicant's heater construction and radiation means connected in heat transfer relationship thereto so as to effect the maximum uniform distribution of heat with a minimum amount of electrical resistance material.

In view of the manner in which the claims presented were considered to define over the applied art, and as the subject matter of the claims was not deemed to be readily obvious from any of the applied art or any combination thereof, it was agreed that the claims herein presented would be considered as allowable.

The objections to the drawing raised by the Examiner were also considered. Enclosed herein is a letter to the Draftsman, authorizing him to correct the drawings as indicated by the red markings on the attached print.

In view of the foregoing amendments and remarks, the application should now be in condition for allowance, and as the instant case has been made special, a prompt Notice of an Allowance is earnestly solicited.

Respectfully Submitted,

Arthur G. Fairbairn

Attorney for Applicant
Tel. No: OX 7-4343

-26-

19-211

SEARCH ROOM

July 9, 1968 S. ARRON 3,392,264

ELECTRICALLY HEATED FOOTWEAR

Filed Oct. 23, 1965

Fig. 1

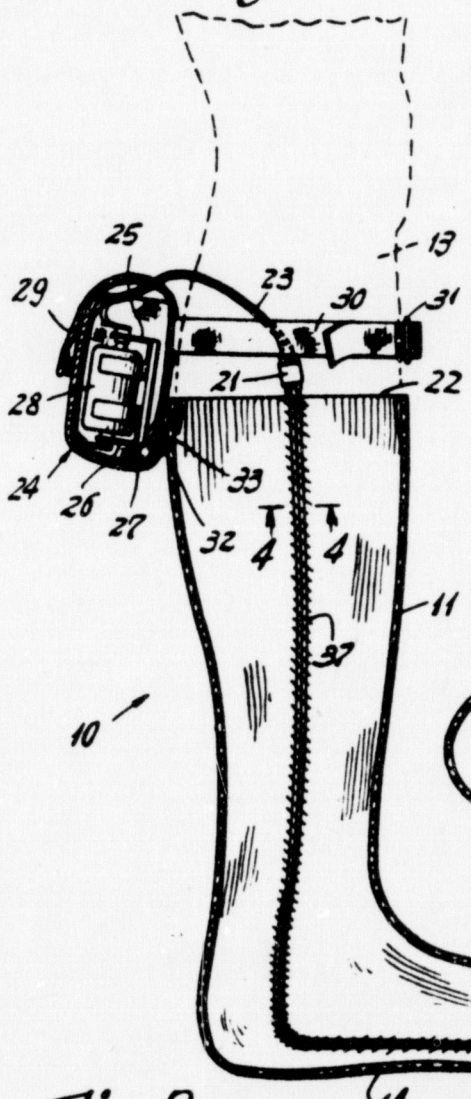


Fig. 3

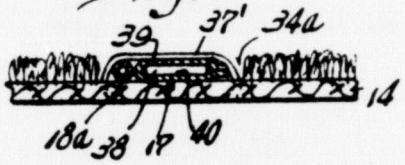


Fig. 4

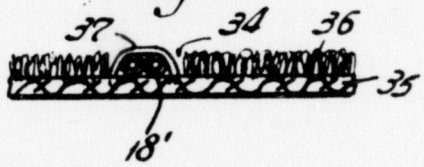


Fig. 5

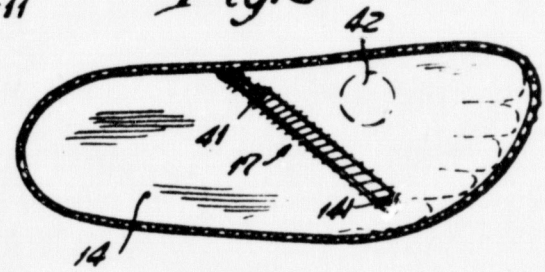
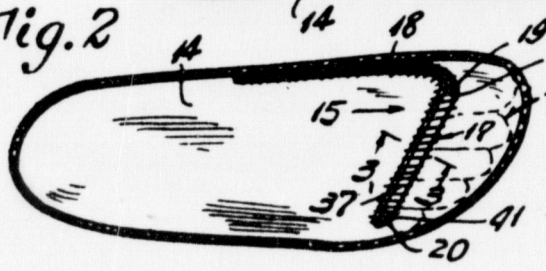


Fig. 2



INVENTOR
Stanley Arron
BY
Johnson and Kline
ATTORNEYS

United States Patent Office 3,392,264
Patented July 9, 1968

3,392,264

ELECTRICALLY HEATED FOOTWEAR

Stanley Arron, 3323 Old Town Road,
Bridgeport, Conn. 06606

Filed Oct. 23, 1965, Ser. No. 503,456
4 Claims. (Cl. 219—211)

ABSTRACT OF THE DISCLOSURE

An electrically heated footwear having a flat thin resistance ribbon secured on the sole to underlie the base of the wearer's toe with a flexible covering thereover and wires connecting the ribbon to batteries carried by the sock.

In many outdoor activities in cold weather it has been found that the extremities of a human body, particularly the feet, do not have sufficient body heat to maintain them comfortable. While it has been heretofore suggested that footwear, whether shoes or stockings, should have heating elements for supplying heat to said extremities, such heretofore suggested heated footwear has not been found completely satisfactory. One objection has been the employment of heating elements which have not been capable of being utilized without discomfort to the user. Another objection has been created by the necessity of using bulky sources of electrical energy, such as large batteries, which are required to be not only inconveniently located on and carried by the wearer but also have awkwardly extending connections between it and the heating element. Furthermore, the use of relatively large storage batteries has required specific types of heating elements which have been found to render such heated footwear quite expensive thereby limiting the usage thereof.

It is accordingly an object of the present invention to provide an article of apparel which supplies heat to the wearer and in which there is a minimum of discomfort and incovenience, if any at all, to the wearer even when engaged in physical activities.

Another object of the present invention is to provide a stocking in which the heat is supplied by the conversion of electrical energy and in which the source of electrical energy may be conveniently, comfortably and unobtrusively carried by the user.

A further object of the present invention is to provide an article of apparel in which the heating element which converts electrical energy into heat is flexible, easily secured to the apparel, comfortable to the touch of the wearer and is shaped to provide a relatively large exterior area for its size.

A still further object of the present invention is to provide a heating stocking which is extremely economical to manufacture, is durable in use and which may be washed in a conventional washing machine.

In carrying out the present invention, a feature thereof resides in providing an article of apparel, specifically a stocking, in which there is secured an electric heating element. The heating element consists of a length of electrical resistance ribbon that is disposed on the interior of the sole portion of the stocking in a location that enables it to supply heat to specific areas of the foot. The resistance ribbon is prevented from direct contact with the foot of the wearer by there being secured on its exterior, a covering of pervious material, such as fibrous material, which permits heat to pass therethrough but yet which insulates the wearer's foot from actual contact with the warmer heating element.

In the present invention, the heating element includes a length of flat thin ribbon of electrical resistance material. The ribbon is configured to be many times wider than it is thick and thus by its thinness is flexible and by its width provides a large area over which heat may be dissipated as compared to other cross-sectional shapes.

The stocking is preferably made of relatively bulky material and formed to provide a channel on its interior surface which extends along the instep covering portion and the leg covering portion of the stocking. The heating element and a pair of electrical conducting wires are contained within the channel with the conducting wires terminating preferably in a detachable electric connector. Also secured to the detachable electric connector is a source of electrical energy, such as a battery through a pair of leads such that the battery may provide electrical energy to the heating element which is mechanically and electrically connected to the wires.

In order to enable the battery to be conveniently carried by the wearer, it is contained within a pouch that includes a strap by which the pouch may be secured about the leg of the wearer. Also, detachable connectors on the pouch and the exterior upper portion of the stocking provide additional securing thereof. Thus, the battery is mounted closely adjacent the heating element but yet is conveniently accessible and comfortably positioned.

Other features and advantages will hereinafter appear.

In the drawing:

FIG. 1 is a view, partly in section, showing the heated footwear of the present invention.

FIG. 2 is a section showing the inner surface of the sole portion of the stocking.

FIG. 3 is an enlarged view taken on the line 3—3 of FIG. 2.

FIG. 4 is an enlarged view taken on the line 4—4 of FIG. 1.

FIG. 5 is a view similar to FIG. 2 showing a further embodiment of the present invention.

Referring to the drawing, the heated footwear of the present invention is generally indicated by the reference numeral **10** and is specifically a stocking having a leg portion **11** and a contiguous foot portion **12**. The footwear **10** is shown in FIG. 1 in the shape which it would assume when it is being worn, with a leg **13** of a wearer being shown in dotted lines. The foot portion **12** includes a sole part **14** whose inner surface is adapted to engage the sole of the wearer with the sole part having a portion **15** adapted to be positioned at about the base of the toes of the wearer, the latter being shown in dotted lines and being indicated by the reference numeral **16**. Secured in the area **15** is an elongate heating element **17** which when energized provides heat to the foot of the wearer.

For conducting energy to the heating element a pair of insulated conducting wires **18** are connected, as by crimp connectors **19** and **20**, to opposite ends thereof. The wires **18** are secured to the inside of the stocking along the portions thereof adapted to overlie the upper instep and the inner leg portion and terminate at their outer end in a releasable connector **21** adjacent the upper end **22** of the leg portion **12**. Also, releasably connected to the connector **21** is an additional pair of insulated conducting wires **23** that extend from a pouch **24** where they are connected to opposite terminals **25** and **26** of a battery holder **27** having a battery **28**. Thus electrical energy may be conducted from the battery to the wires **23**, the releasable connector **21** and the wires **18** to the heating element **17**.

The pouch **24** is preferably formed of fabric to have a releasably securable flap **29** which permits access to its interior in order to remove and replace the battery. Secured on the exterior of the pouch is a strap **30** which is adapted to be wrapped about the upper calf portion of the leg of the user. While the strap **30** may be endless and elastic, it is in the specific embodiment shown formed with separable ends that are secured together as by a buckle **31**. In addition to being supported by the strap **30**, the

pouch is secured to the stocking by means of a releasable connector **32** carried thereby that cooperates with a mating connector **33** mounted on the stocking. As shown, the connectors are of the snap type in which the connector **33** is a male button while the connector **32** forms a female cavity to receive it. Though the pouch is shown located on the back of the wearer's leg **13**, it is within the scope of the present invention to position it at other locations on the leg, such as the inner side or outer side, if desired.

The leg and foot portions **11** and **12** of the stocking are preferably formed of relatively bulky material and in order to minimize the protrusion of the wires **18** from the inner surface of the stocking, the wires **18** are sewed or otherwise secured within a channel **34** that is formed in the material in any convenient manner. Thus if the stocking is made from terry cloth, the channel **34** may be formed by retaining the thread loops in the base fabric **35** rather than pulling them out, as indicated by the reference numeral **36** to form the terry cloth. The wires **18** are each provided with an insulating covering **18'** to insulate them from each other and the wearer and are secured to the fabric **35** as by overcast stitching **37** though other securing means, such as adhesives, may be employed, if desired. The channel **34** includes a length **34***a* which is in the embodiment shown in FIG. 2 adapted to be positioned at the base of the toes of the wearer. Secured in the length **34***a*, as by overcast stitching **37'**, is the heating element **17**.

As shown in the enlarged view, FIG. 3, the heating element includes a length of electrical resistance ribbon **38** which has its periphery completely covered by a piece of pervious material **39** which is preferably secured thereto as by an adhesive **40**. The stitching **37'** extends over the heating element and a portion **18***a* of one of the leads **18** for securing the heating element and lead in the channel **34***a*. The ends of the wires **18** and the ends of the heating ribbon where they are secured together by crimp connectors may be covered by an insulating tape **41**, if desired.

In accordance with the present invention, the battery **28** is a low voltage cell of the rechargeable type, such as the alkaline type or a nickel-cadmium type. Such batteries only have a low voltage, on the order of 1½ volts and the resistance ribbon **38** is selected to have a resistance which limits the current to a value that provides sufficient heat but yet does not become too hot during use to be uncomfortable. Moreover, the value of the current flow is small enough to enable even a small C, D or F size of battery to provide current for a few hours of warmth.

The resistance ribbon **38** which may be formed of a nickel, chromium and iron alloy is obtainable from the Hoskings Manufacturing Company, Detroit, Mich., and called "Chromel C." One specific configuration thereof consists of a length of approximately 3½ inches long by ⅛ of an inch wide by about .004 thousandths of an inch thick. The large width to thickness ratio affects for the amount of ribbon a relatively large peripheral area over which heat is developed while at the same time being extremely flexible by reason of its thinness.

The covering **39** may be secured to the heating element **38** as by adhesive **40** which is capable of withstanding the temperature of the heating element and also washing conditions. Such a covering is made of fibrous material, such as nylon fibers, that have been matted together to form a fabric and one such fabric which may be employed is sold under the name "Pelon." The covering material is not only comfortable to the user when in contact therewith but in the present embodiment serves to prevent direct contact of the user with the heating element while enabling the heating element to retain its flexibility and yet permit convection and/or conduction of heat from the heating element to the user.

In the embodiment shown in FIGS. 1–4, the heating element **17** is adapted to be located adjacent the base of the toes of the wearer. It has also been found that the heating element **17** may be secured on the inner surface of the sole of the stocking to be positioned adjacent the ball of the foot. Thus, as in a farther embodiment of the invention shown in FIG. 5, the heating element **17** extends from adjacent the base of the little toe towards the instep, somewhat adjacent the ball of the foot, indicated by the reference character **42**. The heating element **17** may be secured to the stocking in the same manner disclosed in the previous embodiment, have the same structure and in a channel **43** formed in the sole of the stocking.

It will accordingly be appreciated that there has been disclosed a stocking which supplies heat to a wearer by the conversion of electrical energy into heat. The energy is supplied by a rechargeable battery which is capable of being supported on the wearer's leg, comfortably and unobtrusively adjacent the top of the stocking. The heating element is secured on the inner surface of the stocking and consists of a length of thin, flat resistance ribbon covered with fibrous material. By such a shape, not only is the heating element rendered relatively flexible but it provides a large surface area in which heat is developed while also having sufficient resistance to limit the current flow to a value which maintains it comfortable.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A stocking adapted to supply heat to the foot of a wearer comprising a foot covering portion and a contiguous leg covering portion, said foot covering portion including a sole having a part adapted to underlie the base of the wearer's toes, a heating element secured on the sole part and including an essentially straight length of electrical resistance ribbon having a size to be sufficiently thin to be flexible, a covering of flexible, non-metallic material on said ribbon, said heating element extending only on the part that is adapted to underlie the base of the wearer's toes, said covering material having low heat conductivity to decrease spreading heat from the ribbon to localize the heat at the base of the wearer's toes, a pair of conducting wires secured to the ends of the ribbon and means for connecting the wires to a low voltage source of electrical energy.

2. The invention as defined in claim **1** in which the covering is of textile, fibrous material.

3. The invention as defined in claim **1** in which the source of electrical energy is a low voltage battery, there is provided a pouch for containing the battery and securing means for securing the pouch to the stocking.

4. The invention as defined in claim **1** in which adhesive means secures the covering material on said heating element and in which the said covering material is made of textile fibers.

References Cited

UNITED STATES PATENTS

1,702,583	2/1929	Williams	219—211
2,021,458	11/1935	Macy	219—549.X
2,277,772	3/1942	Marick	219—211
2,329,766	9/1943	Jacobsen	219—211
2,458,119	1/1949	Van Daam	219—211
2,619,580	11/1952	Pontiere	219—528
2,692,326	10/1954	Crowell	219—211
3,079,486	2/1963	Winchell	219—528
3,084,241	4/1963	Carrona	219—211
3,293,405	12/1966	Costanzo	219—211
1,566,987	12/1925	Simmons	219—211
3,268,846	8/1966	Morey	338—212

FOREIGN PATENTS

107,386	10/1927	Austria.
146,353	11/1903	Germany.
546,812	7/1942	Great Britain.

BERNARD A. GILHEANY, *Primary Examiner.*
VOLODYMYR Y. MAYEWSKY, *Examiner.*

toes, a heating element secured on the sole part and including a flat length of electrical resistance ribbon having a large width to thickness ratio to be sufficiently thin to be flexible and a covering of flexible, non-metallic material, said heating element extending only on the portion that underlies the base of the wearer's toe, a pair of conducting wires secured to the ends of the ribbon and means for connecting the wires to a source of electrical energy.

12. The invention as defined in claim 11 in which the heating element is essentially straight to be a linear length thereof and the covering is of fibrous material.

REMARKS

In compliance with the requirement set forth in paragraph 11 of the above-noted Office Action, an abstract is being added to the disclosure by the present amendment.

The objection to the drawing is noted. Appended to this amendment is a letter to the Office Draftsman requesting that changes shown in red thereon be made to the drawing upon the approval of the Examiner. It is believed that these corrections will obviate this objection.

The allowance of claim 9 is noted as is the indicated allowability of the subject matter of claims 7 and 8. By the present amendment Applicant is cancelling claims 1, 2, 3 and 10, amending claims 4, 5, 6 and 7 and adding claims 11 and 12. The claims now remaining for consideration include claims 4-8, 11 and 12 with claims 4, 6 and 11 being independent claims. Claim 9 stands allowed.

Also appended hereto is an Affidavit under Rule 131 swearing back of the filing date of the Costanzo Patent No. 3,293,405 cited as a reference. In view of the affidavit and the remarks herein pertinent thereto it is submitted that this reference can not now be validly employed to show anticipation of the present invention.

Claims 4, 5 and 6 were rejected solely on the ground of being fully met by the reference to Costanzo. Claim 4 from which claim 5 depends has been amended to more fully recite Applicant's concept of having flexible, non-metallic sheet material positioned at least on the top surface of the electric resistance ribbon. Costanzo fails to disclose or teach such a structure as the material 25 is desired to provide a larger heat radiating surface and hence consists of a metallic foil. Clearly any flexible, non-metallic sheet material insofar as Applicant is aware excludes aluminum foil or its like which serves as a radiating means.

Claim 5 depends from claim 4 and is more specific reciting that the sheet material is made of fibers and that adhesive means secures the sheet material in the heating element. Claim 6 has been slightly amended by the substitution of "top flat surface" for "periphery". This claim also brings forth the use of the thin electric ribbon and covering material. Claim 7 depends from claim 6 and additionally brings out Applicant's concept and structure of providing a pouch for holding the batteries. This claim has been somewhat broadened from that indicated as being allowed to eliminate the limitation that the pouch is releasably secured to the stocking. Claim 8 is believed to still contain allowable subject matter even

though claims 6 and 7 from which it depends have been somewhat altered.

Claims 11 and 12 are being added to protect Applicant's concept of the heating element being secured on the sole part of the stocking in a position which is adapted to only overlie the base of the wearer's toe while claim 12 brings out that the heating element is essentially linear.

The Costanzo patent, while showing a heating element, shows a heating element which does not have a flexible, non-metallic covering; is not adapted to overlie just the base of the wearer's toe; is not secured onto the sole portion of the stocking and fails to provide in such absent structure the combination recited in claim 7 of the addition thereto of a pouch. It is thus submitted that the claims now present in the application do not define an invention which is covered by any of the claims of the Costanzo patent and even if the Costanzo reference is a valid reference, the present claims fail to be anticipated by the teachings of Costanzo.

With respect to the other references cited, the Marick Patent No. 2,277,772 discloses a heated garment. The Examiner's attention is directed to the foot heating portions 55 and 56. As stated on page 4, column 1, lines 37 et seq., the wires 55 extend along the sole and upwardly around the toe. This structure fails to disclose Applicant's concept of the positioning of the heating element only at the base of the wearer's toe. Moreover, the heating element disclosed in this patent is not a length of resistance wire having a relatively large width to thickness ratio.

The Jacobsen Patent No. 2,329,766 discloses foot covering portions in which, as set forth on page 2, column 2, lines 65 et seq., the tape 56 may extend over the sole or under part of the foot of the stocking "but it has been found that this makes the stocking slightly uncomfortable to walk with". Applicant has found that for the particular combination recited in these claims of a thin relatively wide resistance ribbon covered with a flexible non-metallic covering that such a stocking is extremely comfortable in use even when walking.

The other references cited by the Examiner in the Office Action have been carefully considered but as the Examiner appreciated in the Office Action, not one of these references, either singularly or in combination, is anticipatory of the structure of the present claims.

The Examiner's attention is directed to the affidavit filed under Rule 131 appended hereto. This affidavit, by the inventor, points out that he had been associated with another and worked on battery heated devices, one of which was a stocking. The association became disunited and in order to protect his ideas, he wrote on August 23, 1965 (three or four weeks before the filing date of the Costanzo patent of September 13, 1965) a communication to himself relating to low voltage heating elements. There is set forth in this communication (Exhibit I) the thought of having a porous cloth covering on the resistance ribbon so as to provide a covering and finished appearance thereto and still be washable and flexible.

The inventor then continued his independent diligent work on the heated sock by buying material on September 1, 1965 as shown in Exhibits II and III. For most of the first two

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weeks in September he made and tested various heating elements.

As pointed out in paragraph 8 of the affidavit, the inventor found the structure of at least one heating element before the filing date of the Costanzo patent that was satisfactory to him. He personally sewed this heating element into a sock before September 13th. The inventor then tested the sock on September 13th and found that it.was "Better than Expected" (Exhibit IV). It will be noted from this test that the sock was operated for about three hours and that it was warm. The inventor on September 13th and 14th, on the same sock, made a further test using a carbon type battery and this test is indicated on Exhibit V. Paragraph 9 relates to Exhibit VI which is a photograph of the sock mentioned in paragraph 8. As the Examiner will appreciate from a study of the photograph, the heating element has a covering and extends substantially linearly across the sole to which it is secured by stitching in a position wherein it is adapted to overlie the base of the toes of the wearer. The photograph further shows the use of a buckle and a pouch in which batteries may be positioned with wires extending between the pouch and the heating element.

Paragraph 10 sets forth that the inventor was satisfied with the sock that he had made and tested and that within a day or two, he had commercial samples made by a Mrs. Kosma who was a professional seamstress. Mrs. Kosma executed a statement (Exhibit VII) relating to her activities on September 17th, wherein she made socks, tested them and found them satisfactory.

The inventor further states in paragraphs 12-14 that he contacted his patent attorney and that the application was drawn up and filed in approximately one month starting from

the same day as the filing of the Costanzo application. Paragraph 15 brings forth that not only was the inventor pleased with the socks but also that he was able to secure a licensee therefor.

The affidavit and incorporating exhibits show that on the same day that the Costanzo patent was filed that the inventor, Arron, was testing and finding satisfactory a heated sock which is described and claimed in his application. The inventor must have made the sock previous to his test on September 13th. He could not in one day test the sock and have a conference with his patent attorney and also make the sock. Thus the sock had been made prior to the filing date of the Costanzo patent. It was made with a heating element that, as set forth in paragraph 7 of the affidavit, had been tested and found satisfactory so that the inventor had an indication, if not positive proof, that this heating element would perform satisfactorily when sewed into a sock.

Even if the Examiner should consider that such activities do not constitute a reduction of practice prior to the filing date, clearly an actual reduction to practice occurred on the same day as the filing date, as shown by Exhibits IV and V. From the date of the self-directed communication (Exhibit I), it will be clear to the Examiner that the inventor, Arron, was diligent from this time (August 23, 1965) until his actual reduction to practice on the same day as the filing date of the Costanzo patent.

The subject matter in paragraphs 10, 11 and 15 is included to show that the inventor was satisfied with the results of his tests on September 13th.

The subject matter in paragraphs 12 through 14 is included so that, should the Examiner find contrary to the evidence that there has not been an actual reduction to practice then the reduction to practice can be constructive. The affidavit brings out that before the filing date of the Costanzo patent, Arron had taken a step to patent his invention by requesting an appointment with his Patent Attorneys on September 13th. The application was filed on October 23rd. Clearly, the time for preparing the application was short and hence is proof that diligence occurred from before the Costanzo filing date to the filing date of the instant application.

In view of the above, it is accordingly requested that the Costanzo reference be withdrawn as being anticipatory subject matter.

An early notice of allowance is accordingly solicited.

Respectfully,

JOHNSON & KLINE

By Emanuel M. Johnson

Bridgeport, Connecticut
Tel. No. 203 336-1158
November 14, 1967
Encls.
EMJ:k

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IN THE UNITED STATES PATENT OFFICE

In Re Application of	:	
Stanley Arron	:	
Heated Footwear	:	Group 213
Serial No. 503,456	:	
Filed October 23, 1965	:	

AFFIDAVIT UNDER RULE 131

State of Connecticut :
: ss. Bridgeport
County of Fairfield :

I, Stanley Arron of 3323 Old Town Road, Bridgeport, Connecticut, being duly sworn hereby depose and state that:

1) I am the inventor of the subject matter disclosed and claimed in U.S. patent application Serial No. 503,456, filed October 23, 1965 and entitled "Heated Footwear".

2) Prior to August 23, 1965, I had been associated with another in the consideration and development of heating devices utilizing batteries. One of these devices was an electrically heated sock. The association became disunited and I obtained possession of some of its materials which included socks and lengths of different electric resistance ribbons.

3) On August 23, 1965, I wrote a description of my ideas and mailed it to myself by certified mail on August 25th. I thought that if I did this I could protect them. A copy of the description is appended hereto and marked Exhibit I. The typewritten portion is identical to the original which I have in its unopened, sealed envelope.

4) I then proceeded to develop my idea of an electrically heated sock, having a heating element that included a length of a resistance ribbon and a porous cloth taping over the ribbon. The taping was to provide a cover and finished appearance to the heating element while still enabling it to be washable and flexible as opposed to a metal sheet or foil covering.

5) On September 1, 1965, I bought batteries and a crimping tool for making crimped connections of wires to battery terminals and to the ends of the resistance ribbon. A copy of a sales slip showing these purchases is appended hereto and marked Exhibit II.

6) Also on September 1st, I bought a piece of fabric tape known as "Pelon" and buckles. The "Pelon" tape was to serve as the covering for the resistance ribbon and the buckles were for the strap on the pouch that carried the batteries. A copy of a sales slip for purchasing these items is appended hereto and marked Exhibit III.

7) For most of the first two weeks in September, 1965 I made many variations of resistance ribbons, varying them in length, cross-section and material. I tested them by simply connecting batteries to the resistance elements to see how warm they were by feeling them. Some I covered with the fibrous material. If they seemed satisfactory I sewed the heating element resistance wire and cloth covering into a sock and then tested it by wearing it and noting my reaction to its heat. I wanted to have a heating element which was comfortably warm and yet provide heat a relatively long time when using a pair of D cell batteries as the electrical source.

8) Prior to September 13th, I had found at least one heating element that tested satisfactorily when connected to batteries. I personally sewed this heating element into a sock. On September 13, 1965, I personally tested this sock by wearing it. I wrote notes as to my reactions to it on a piece of paper, a copy of which is appended hereto and marked Exhibit IV. The notes show that "D cell" size batteries were used and that they were of the "alkaline" type. The test started at 12:40 and continued to 3:40. At 1:40 my reaction was that it was "almost hot", at 2:50 that it was "very warm" and at 3:40 it was disconnected. My conclusion was that for "3 hrs." the "sock quite warm" and "Better than Expected".

I made a further test on the same sock by personally wearing it on September 13th and 14th and wrote my reaction to it on a piece of paper, a copy of which is appended hereto and marked Exhibit V. This exhibit relates that at different times the heating element was "very warm" and had "good heat". The exhibit further shows that the resistance ribbon was a "short element". The notation "Kent D cell" was made to indicate the make and size of batteries while the notation "Same as used on Barkers" was made to indicate that the batteries were carbon cells.

9) I still have this electrically heated sock. In the latter part of October, I had a photograph made of it for this affidavit and said photograph is appended hereto and marked Exhibit VI. The body of the sock is marked A in ink, the heating element is marked B, the wires marked C, the battery pouch marked D and the strap and buckle marked E. The heating

element is a length of flat resistance ribbon having a relatively large cross-sectional width to thickness and is covered with cloth tape, specifically "Pelon".

10) I had been in contact with a sock manufacturer who was desirous of making heated socks. In order to provide commercial samples of my sock that I had found satisfactory, I hired a Mrs. Kosma, a professional seamstress, to make the samples. I supplied her with the material including socks, heating elements having a cloth tape covering, connecting wires and battery holders. She sewed the electrical parts to the socks and tested them on September 17, 1965.

11) On October 8, 1965 I had Mrs. Kosma make a signed statement of her acts and I mailed the original to myself by certified mail. A copy of the typewritten part of her statement is appended hereto and marked Exhibit VII.

12) In the week preceding September 13, 1965, I called Johnson & Kline, Patent Attorneys, for an appointment on September 13th to discuss my invention. On September 13th, September 16th and September 30th, 1965, I had conferences with them at their office to explain my invention on a heated sock and to begin the patenting of it.

13) On October 22, 1965, I also had a conference at their office at which time I studied the application papers to see if it disclosed my invention and as it did, I signed the oath that I invented the subject matter claimed therein.

14) I have been informed that the application which I signed was filed without changes in the Patent Office on the above-noted date and received the said serial number.

15) In the latter part of September, 1965, I entered into a license agreement with the sock manufacturer

who had supplied the original socks and to whom I showed the commercial samples made by Mrs. Kosma.

Further deponent sayeth not.

Signed this 14th day of November, 1967.

Sworn and subscribed to before me this 14th day of November, 1967.

Notary Public

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EXHIBIT I

Stanley Arron 3322 Old Town Road Bridgeport,Conn

Date 8/23/65 AUGUST 23,1965 Date 8/23/65

This is to record my ideas and concept for the manufacture of Low Voltage Electric and Battery Operated Clothing,Blankets, Sleeping Bags with the emphasis on Socks and Gloves.

Previous to this time it was not possible to make a low cost heated sock or glove in which the heating element was intertwined among the yarns or woven into the fiber or Yarns. This is because of the problems of insulation, short circuiting, and that all heating elements in use consist of wire. They can not get the Ohmic resistance of the wire down as low as 8/10 of an Ohm or 1 Ohm. Also the construction is expensive because the wires have to be insulated etc.

The problem is solved by the use of Resistance ribbons, which when heated, form an oxide and an insulation. This ribbon can then be intertwined between the Yarns of knitted material or placed on the top of the knitted, woven or matted surface; then anchored in place by stitching with thread, stapling or the most economical efficient way. Porous cloth taping can then be placed over the element, if desired, depending on application, to provide a cover and finished appearance. The covering should be washable and flexible, and can also function as insulation.

The most suitable ribbons and strip for these applications are Nickel-Chrome Alloys, more specifically Tophet "C" or "D" and Hoskins' Chromel"A"or"C", Size 1/16 X .0021, or similar 6 ft length depending on variations of Resistance Characteristics for the various products and Battery Sizes. Battery Sizes can be "C" Cells, "D" Cells,"F" Cells; Voltages from 1½ Volts on Alkaline Types and 1½ Volts on Nickel/Cadium types are best for small items; 6 Volt and even 12 Volt for larger items.

Two important characteristics of this is that these items are completely washable,by Automatic Machine, and will be able to be sold at the lowest possible prices. The products currently being made are not Machine Washable, without structural damage. Products made with this method and system will have the best possible price advantages.... Some products being able to sell for as little as 25% of products now on the market. For example heated sox are selling for $15.00. Sox made under this system can be as little as $3.75 retail.

Signed by

At - Bridgeport,Connecticut

Date- Aug 23,1965

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-2-

EXHIBIT II

Date 9-1 1965

M

No.

Reg. No. Clerk ACCOUNT FORWARDED

1	Egg Talk Sling Cells		50
2			
3	510		10
4			
5	Crimp Tool		350
6			
7			50
8			14
9			
10	Distribution Fees		5.64
11	Beryllia		
12			
13			
14	49		
15	12A		

Your account stated to date. If error is found return at once.

EXHIBIT III

Printed figures above show amount paid or charged

1242 Main St. DAVIDSON'S 333-4127

DRESS FABRICS — DECORATOR FABRICS

Clerk Bridgeport, Conn. 19

Name

Address Am't Rec'd

1	1/2 (Yellow)	
2	Buck (Burgess)	3 00
		0.4

S-12 Form of The National Cash Register Co., Dayton, Ohio

712-15

EXHIBIT V

V

TUESDAY

MAY 1965

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

15

JUNE 1965

JULY 1965

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Kurt P Call Short Elem

APPOINTMENTS

7 a.m. Same as usual on Bikes

8 a.m. 11:55 PM Very busy

9 a.m. 12:10 p.m. " "

10 a.m. 12:30 pm Crew Cut

11 a.m. 12:40 p.m. " " (Less)

12 noon 1 PM Still Sunt Hunt

1 p.m. 1:10 PM Not Hurt

2 p.m.

3 p.m.

4 p.m.

5 p.m.

No. 600158

RECEIPT FOR CERTIFIED MAIL—20¢

SENT TO Stanley Arno

STREET AND NO. 323 Old Town Rd

CITY, STATE AND ZIP CODE Fairfield Conn

If you want a return receipt, check which ☐ 10¢ shows to whom and when delivered ☐ 35¢ shows to whom, when, and address where delivered

If you want delivery only to addressee, check here ☐ 50¢ fee

POSTMARK OR DATE

FEES ADDITIONAL TO 20¢ FEE

NO INSURANCE COVERAGE PROVIDED—NOT FOR INTERNATIONAL MAIL (See other side)

POD Form 3800 July 1963

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EXHIBIT IV

STANZO ELECTRONICS

3/13/65

STANZO ELECTRONIC INDUSTRIES, INC.

P. O. BOX 2186 – BRIDGEPORT, CONN. • AREA CODE 203-374-3600

D Ce-O Alkaline

Total 12 40

1:40 Almost Hot

2:50 Very Warm

3:40 Disconnect

3 hrs { Sock Quite Warm
Better than expected

31 cont.

EXHIBIT VI

EXHIBIT VII

Bridgeport, Conn
October 8,1965

TO WHOM IT MAY CONCERN:

This is to record that on September 17,1965, I sewed Electric Heating Elements and connecting wires into some socks for Mr Stanley Green. I also attached the Battery Container and Battery. Upon completion of the work, I tested the Socks and they worked satisfactorily.

10/65
58 9mm
Certified

Witness:
Helen Cassin

Sincerely Yours

Katherine Kosma
Katherine Kosma

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14. The invention as defined in claim 13 in which the covering is of textile, fibrous material.

15. The invention as defined in claim 13 in which the source of electrical energy is a low voltage battery, there is provided a pouch for containing the battery and securing means for securing the pouch to the stocking.

16. The invention as defined in claim 13 in which adhesive means secures the covering material on said heating element and in which the said covering material is made of textile fibers.

REMARKS

The Examiner is thanked for the courtesy extended during an interview with Applicant's attorney in the present application. At the interview the claims being proposed herein were discussed and it was believed that they define patentable subject matter and would thus be allowable. In addition the other claims in the application are being cancelled in view of the indicated allowability of the herein proposed four claims 13-16. Thus the application now contains only essentially allowed claims.

The claims now presented are particularly directed to Applicant's concept of providing a sock with an electric heating element that is energized from a low voltage source. The heating element includes a length of electrical resistance ribbon that has a covering which is flexible, non-metallic and has a low heat or thermal conductivity. Moreover, the heating element is essentially straight and is positioned in the sock

so that when the sock is worn, the heating element will be positioned to underlie the base of the wearer's toes. The use of low heat conductivity material for the covering plus the particular location of the heating element serves to effect a localizing of the heat from the heating element just at the base of the wearer's toes.

As pointed out at the interview, the battery or low voltage source will provide only a definite quantity of electrical energy and hence only a definite quantity of heat. By the positioning of the heating element and essentially localizing the heat at the base of the toes, Applicant thus provides heat to the wearer's foot at a most sensuous area of the foot where it will produce a maximum physiological effect on the user. It is also noted that the toes are the part of the foot which first normally reacts or is sensitive to cold and thus is accordingly the place where heat is believed to be most desirable.

The positioning of the heating element at the base of the wearer's toes has the additional especial advantage of being located in a place which does not have any weight thereon when the user is standing or walking and hence the heating element cannot cause discomfort to the user.

The sixteen references cited during the prosecution of the application were considered and it was pointed out that not one discloses the concept of providing a localized heating at the base of the wearer's toes.

Patent No. 1,702,583 shows a large area that is heated by a long length of resistance wire 24. Patent No. 1,566,987 shows a resistance wire which may be seven feet long for one foot and thus serves to heat a large area. Patent No. 2,021,458

shows an electric heating pad for a large area. Patent No. 2,277,772 shows a current conductive rubber with a large area of the foot being heated. Patent No. 2,329,766 again shows a large area of the foot that is heated by an electrical resistance element, i.e. tape 56, with the tape extending only on the sides and top of the foot. Patent No. 2,458,119 shows essentially the whole bottom surface of the foot adapted to be heated by a heating element (Fig. 4). Patent No. 2,619,580 discloses an electrically heated floor covering which again teaches the concept of heating a large area. Patent No. 2,692,326 discloses in Fig. 5 a shoe which has a coil 20 which again covers a large area of the foot. Patent No. 3,079,486 shows in Fig. 5 a heated sock in which "The entire sock is accordingly heated." (column 2, lines 54,55). Patent No. 3,084,241 shows body heating elements which again heat a large area of the body. Patent No. 3,268,846 shows a heating tape of many widths of resistance wire.

Patent No. 3,293,405, the Costanzo patent, while disposed of as a reference in view of Applicant's Affidavit under Rule 131, discloses the concept and structure of having aluminum foil spread the heat over a relatively large area of the foot. Austrian Patent No. 107386 shows a heated footwear which again heats a substantial part of the foot. German Patent No. 146353 shows a heated shoe which also has heat supplied over essentially the whole foot bearing area. German Patent No. 359739 discloses tubes which fit onto each of the wearer's toes and which have heating elements secured therein so that actually the toes are heated rather than the base of the toes and also the heating element by being on the front part of the toes is on a weight bearing area of the foot.

British Patent No. 546,812 discloses in Fig. 6 a substantial portion of the foot being heated by relatively large heating units.

It is thus pointed out that not one of the patents discloses Applicant's concept of heating a limited area of the foot, which area is a sensuous area and which is also a non-weight bearing area. Hence maximum advantage of the heat from a battery is achieved and also even during walking the heating element cannot cause discomfort.

The specification sets forth that the covering material 39 is made of fibrous material, such as nylon fibers which are synthetic textile fibers. Additionally, as is well known in the trade, textile fibers have a low thermal or heat conductivity as opposed for example to metals such as aluminum which have a high heat conductivity. By using low heat conductivity materials, the heat from the resistance ribbon thus tends to be localized rather than spread over a large area which would occur if the covering was of high heat conducting material.

In view of there being no formal objections to the specification and as the only claims now remaining in the application are considered to be allowable, an early notice of allowance is accordingly solicited.

Respectfully,

JOHNSON & KLINE

By Ernest M. Junkins

Bridgeport, Connecticut
Tel. No. 203 336-1158
March 14, 1968
EMJ:k

IN THE UNITED STATES PATENT OFFICE

In Re Application of :
Stanley Arron :
Electrically Heated Footwear : Group 216
Serial No. 503,456 :
Filed October 23, 1965 :

Honorable Commissioner of Patents
Washington, D.C. 20231

S i r :

Subject to the approval of the Examiner, kindly add the enclosed Declaration to the above-noted application. In reviewing the file, it was noted that all the allowed claims were presented in an amendment filed March 15, 1968. The Declaration is in accordance with Rules 67 and 68 and is being filed to eliminate any questions that the subject matter of the allowed claims was not a part of the invention that was originally presented. It is thus requested that the Declaration be entered.

The claims presented in the amendment were amended by an Examiner's Amendment dated April 10, 1968 after authorization obtained during a telephone conference with the undersigned. The amendment was for the purpose of more particularly pointing out Applicant's concept relating to localizing the heat by having low heat conductivity material cover the heating element. Thus the covering serves to decrease the spreading of heat from the ribbon. This is in contradistinction to the use of high heat conductivity material which would serve to readily

spread the heat from the ribbon over a wider area.

The change in the title has been noted.

The Examiner is thanked for the courtesy extended during the telephonic conference.

Respectfully submitted,

JOHNSON & KLINE

By Ernest M. Junkins

Bridgeport, Connecticut
Tel. No. 203 336-1158
April 29, 1968
Encl.
EMJ:k

Aug. 18, 1970 S. ARRON 3,524,965

ELECTRIC HEATING ELEMENT FOR APPAREL

Filed March 4, 1969 2 Sheets-Sheet 1

Fig. 1

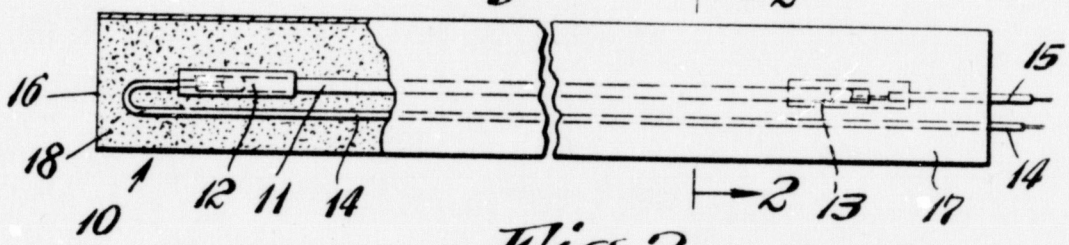


Fig. 2



Fig. 3

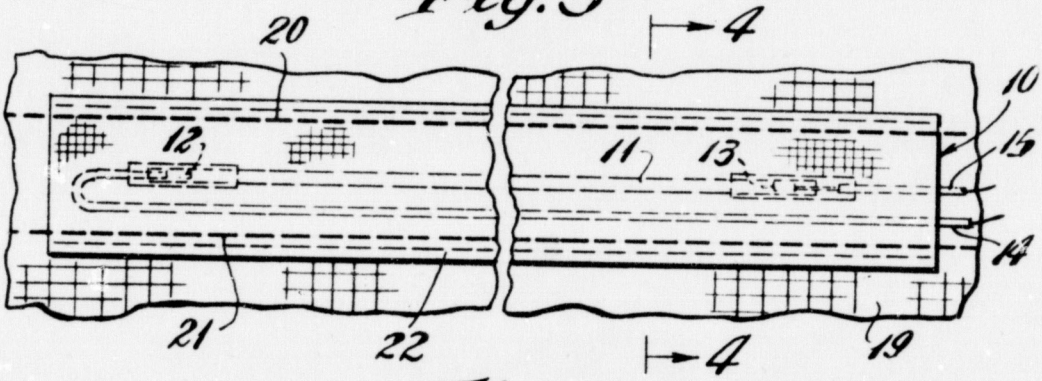


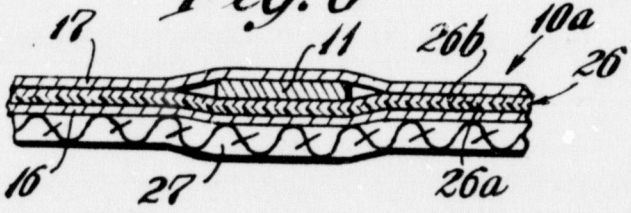
Fig. 4



Fig. 5



Fig. 6



INVENTOR.
Stanley Arron
BY
Johnson and Klaus
ATTORNEYS

Aug. 18, 1970 S. ARRON 3,524,965

ELECTRIC HEATING ELEMENT FOR APPAREL

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Fig. 8

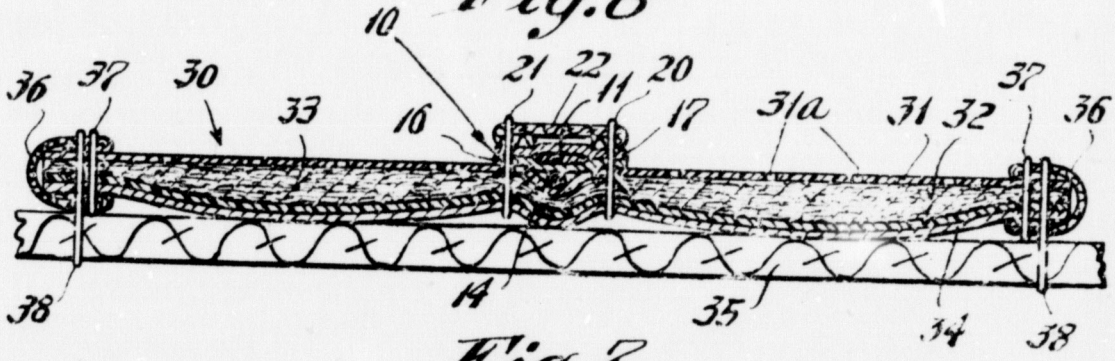
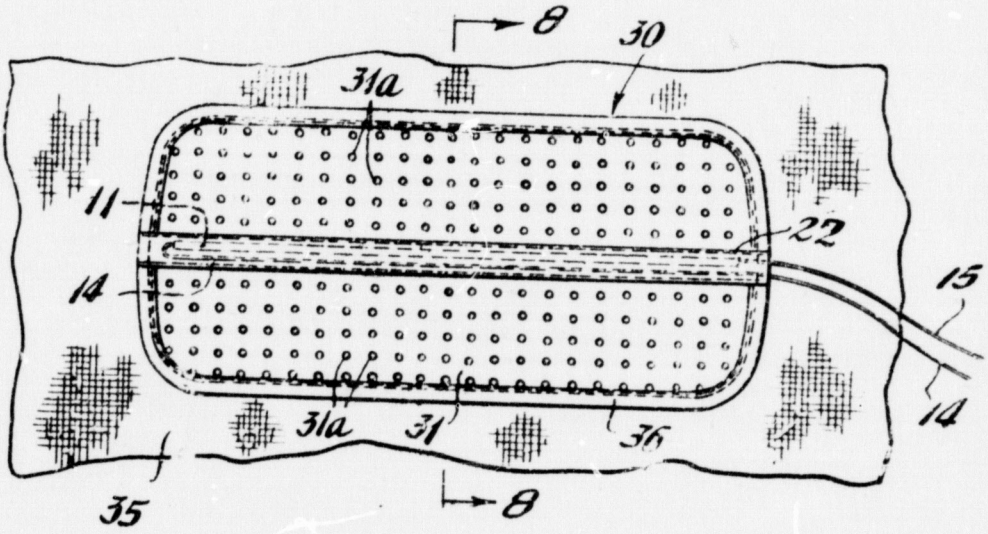


Fig. 7



INVENTOR
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United States Patent Office 3,524,965 Patented Aug. 18, 1970

3,524,965

ELECTRIC HEATING ELEMENT FOR APPAREL

Stanley Arron, 3323 Old Town Road, Bridgeport, Conn. 06606

Continuation-in-part of application Ser. No. 597,634, Nov. 29, 1966. This application Mar. 4, 1969, Ser. No. 804,148

Int. Cl. H05b 3/36

U.S. Cl. 219—211 10 Claims

ABSTRACT OF THE DISCLOSURE

A heating element for use with a body garment having a length of resistance ribbon that is adhesively secured between a pair of flexible strips with the strips being wider than the ribbon and with a row of stitching securing only the outer edge portions of the strips to a garment. The stitching may also secure a tape covering for the strips and an insulating layer underlying the strips to the garment. The heating element may also be part of an insulated heating pad of larger size with the heating element being secured to the pad and the pad being secured along its edges to a garment.

This application is a continuation-in-part of my copending application Ser. No. 597,634 filed Nov. 29, 1966, now forfeited.

In my Pat. No. 3,392,264 granted July 9, 1968, there is disclosed an article of apparel, specifically a stocking, in which an electric heating element is secured. The element includes a ribbon of electric resistance material having a large width to thickness ratio that is positioned on the inner surface of the toe portion of the stocking. In this position, while in use and during washing, it is subject to considerable movement and this movement has been capable of causing the ribbon to twist, crinkle or otherwise present an other than flat, wide surface to the foot of the wearer to cause discomfort. Moreover, during the manufacturing operation the heretofore disclosed manner of securing the ribbon to the stocking by using overcast stitching has been found to be extremely slow, difficult and relatively expensive.

It is accordingly an object of the present invention to provide an electric heating element that includes a length of electric resistance ribbon which may be secured in a garment and even though subjected to considerable movement, maintains the presenting of a flat side to the user.

Another object of the present invention is to provide an electric heating element of the above type in which the heating element resists twisting, crinkling, etc., even when in use and during laundry operations.

A further object of the present invention is to provide an electric heating element that achieves the above object and yet which is so constructed and arranged as to be easily, effectively and economically incorporated into a garment.

Still another object of the present invention is to provide an electric heating element which is attached to an insulated pad of a larger size than the element and in which the pad is secured to the garment.

In carrying out the present invention, there is provided an elongate ribbon of electrical resistance material which has a relatively large, on the order of 20 to 30 times, width to thickness ratio. The wire is energized by a battery and the passage of current therethrough increases the temperature of the ribbon to thereby supply heat. The ribbon in addition to having a resistance which controls the quantity of current therethrough is also required to be quite flexible and hence is quite thin, on the order of only a few thousandths of an inch. The heating element

is positioned to present its wide side to the user at all times as twisting or crinkling could present sharp edges which may create discomfort.

In accordance with the present invention the ribbon is secured or sandwiched between a pair of relatively wide flexible strips. The abutting surfaces of the strips and the ribbon are secured together, as by an adhesive to thus form a unitary heating element. The element is then secured to an article of apparel by parallel rows of stitching which pass through the outer edge portions of the two strips. The rows of stitching are preferably spaced sufficiently apart such that they inherently prevent twisting or crinkling of the strips with respect to the garment. Accordingly, even though the stitching is at the outer edge portions of the strips, the strips are made to be substantially wider than the width of the ribbon to provide the desired spacing between the wide strips of fabric which are then secured to the garment.

If desired, the heating element may be covered by a length of fabric tape, such as bias tape, and the same lines of stitching that secure the heating element to the garment also secure the tape thereto. In such a construction it has been found desirable to have the tape and fabric of substantially the same width. In addition, if desired, an insulating layer may be positioned between the heating element and the garment and also held in place by the parallel rows of stitching. Such an insulating layer may be both resistant to the passage of heat towards the outer portion of the garment by conduction and/or radiation.

While the heating element may be secured directly to the garment, the present invention also provides for the securing of the heating element to an insulating pad in the same manner as if it were secured to a garment. The pad is formed of a plurality of layers of highly heat insulating material, is of a much larger size than the heating element and is secured along its edges to the garment. The pad has substantially less heat loss than the adjacent portions of the garment to thereby decrease loss of heat from the heating element outwardly and also serves to decrease the loss of body heat from the area thereby enhancing the sensible effect of the heating element.

Other features and advantages will hereinafter appear.

In the drawing:

FIG. 1 is a view of the electric heating element of the present invention.

FIG. 2 is a section taken on the line 2—2 thereof and somewhat enlarged.

FIG. 3 is a view of the heating element secured to a garment and in which bias tape is also employed to cover the heating element.

FIG. 4 is a cross-section taken on the line 4—4 of FIG. 3 and somewhat enlarged.

FIG. 5 is a view similar to FIG. 4 in which an insulating layer is provided.

FIG. 6 is a view similar to FIG. 5 in which the insulating layer is positioned between the strip.

FIG. 7 is a plan of a heating element mounted on an insulating pad and the pad being secured to a garment,

FIG. 8 is a section, substantially enlarged, taken on the line 8—8 of FIG. 7.

Referring to the drawing, the heating element is generally indicated by the reference numeral 10 and includes an elongate resistance ribbon 11 formed of electrical resistance material. One type of material which may be used, as set forth in my above-noted patent, is "Chromel." The ribbon has a relatively large width to thickness ratio and one example that has been found satisfactory is a ribbon having a width of 1/16 of an inch and a thickness of .003 to provide a width to thickness ratio of about 20:1. The length of the ribbon may be of any desired size pro-

vided that its shape is such that it provides sufficient resistance to limit the temperature which it attains upon energization. Connectors **12** and **13** are secured to the end portions of the ribbon **11** and insulated wire conductors **14** and **15** are secured to the connectors **12** and **13** respectively to enable electric current to pass through the wire **14**, through the ribbon, and the other wire **15**.

In carrying out the present invention the ribbon is disposed between a pair of strips **16** and **17**. While the strips may be individual, it is preferred, as shown, that they be formed by a single strip that has been folded upon itself. The inner abutting surfaces **17***a* and **16***a* of the strips are adhesively secured together by an adhesive **18** substantially throughout their abutting length. Moreover, the adhesive **18** substantially secures the wide surfaces **11***a* and **11***b* of the ribbon to the strips. With this construction it will be appreciated that the strips **16** and **17** and the ribbon **11** are adhesively secured together to form a unitary structure and that the ribbon is normally incapable of shifting with respect to the strips.

Upon forming the heating element in the manner above described the heating element may then be secured to a garment **19** by parallel rows of stitching **20** and **21** that extend through the outer edegs of the strips and also the garment. As shown, the strips are substantially wider than the heating element and one width that has been found acceptable is ½ to ⅝ of an inch. Thus the rows of stitching may be spaced perhaps ⅜ of an inch apart. In this manner, the stitching rows **20** and **21** by securing the heating element to the garment at lines relatively widely spaced prevents the heating element from twisting, crinkling or otherwise substantially shifting with respect to the body garment. As the ribbon **11** of the heating element is secured to the strips, the ribbon is thus prevented from also shifting and thus will continually present its flat wide side **11***a* to the user.

The material from which the strips **16** and **17** are formed is preferably relatively thin flexible fabric. One specific example which has been found satisfactory is a matted fabric sold under the registered trade name "Staflex." Also, the adhesive **18** that secures the surfaces **16***a* and **17***a* together and the ribbon thereto preferably is of the heat activated type such that it is only cohesive at temperatures substantially higher than environmental temperatures. The temperature produced by an electric sadiron has been found satisfactory so that merely ironing the strips and ribbon is sufficient to effect the adhesion therebetween. For convenience, the adhesive **18** may be applied to one or both of the surfaces **16***a* and **17***a*. The use of heat activated adhesives prevents the energized heating element from decreasing its bond as the cohesive temperature is above the temperature that the ribbon achieves. Also, during the stitching operation, the adhesive is not tacky and the sewing machine needles that form the stitching lines **19** and **20** pass therethrough without the adhesive becoming lodged on the needle to thereby cause the needle to malfunction.

While the heating element may be used as shown in FIGS. 1 and 2 and directly contacted by a user, it has been found desirable to overlay the heating element with a length of fabric **22** such as bias tape. The tape **22** is specifically shown as being held in place by the stitching **20** and **21** and as such has a width which is greater than the distance between the rows of stitching **20** and **21**. The tape **22** is also, as shown, at least as wide as the strips **16** and **17** and accordingly serves to somewhat conceal and protect said strips. In addition, the conductor **14** is placed between the tape **22** and the garment **18** so that the conductor **14** is disposed within the channel formed by these two elements and the row of stitching. Thus both conductors **14** and **15** may extend to be enclosed within a tunnel formed by, for example, a continuation of the tape **22** secured to the garment.

Though both conductors **14** and **15** are not secured to the garment but only retained in the tunnel formed by the tape **22**, a pulling force on the conductors is capable of being transferred to the heating element. However, as the heating ribbon is secured to the strips **16** and **17**, it tends to resist displacement by such a pulling force.

While a substantial portion of the heat produced by the heating element **10** is utilized by the user, in some instances, in order to decrease the heat loss through the garment **18**, it may be desirable to provide between the garment **18** and the heating element **10** a length of insulating material **23**. This material may be of the type such as is well known in the trade that has a reflective layer **24** and an insulating layer **25**. The layer **24** may be formed of aluminum to decrease radiant heat loss to the garment while the layer **25** may be made of insulating batting, foam plastic having air pockets or a thin plastic film. Preferably the insulating material **23** is of a width sufficient to enable the stitching **20** and **21** to extend to the outer portions thereof.

FIG. 6 discloses a further embodiment of the present invention in which insulating material is incorporated directly with the heating element. This insulated heating element **10***a* includes not only the ribbon **11** and strips **16** and **17** of the heating element **10** but also a strip **26** of insulating material positioned between the element **11** and the inner surface of the strip **16**. The outer surface of the strip **16** is designed to be positioned against a garment **27** with the insulating material **26** reducing heat loss to the garment. It has been found that the strip **26** may be formed of thin (.003–5") polyester backing film **26***a* such as "Mylar" on which is vacuum deposited a layer of aluminum **26***b*. Thus the layer **26***b* serves to decrease heat loss by radiation while the layer **26***a* decreases conduction heat losses.

It has been found preferable to have the strip **26** extend substantially coextensive with the strips **16** and **17** so as to have lines of stitching **20** and **21** pass therethrough. Also, it has been found advantageous to unite the contacting surfaces of the strips **26** and **16** to prevent relative movement therebetween as by the adhesive **16***a* with or without a pressure sensitive adhesive on the contacting layer of the strip **26**. The adhesive **17***a* on the layer **17** unites to the top surface of the strip **26** to maintain a unitary heating element.

While the heating element **10** may be directly secured to a garment as shown, it has been found that its sensible heating effect may be enhanced if an insulating pad, such as a pad **30** is utilized. As shown in FIGS. 7 and 8, the heating element **10** may be secured to the pad by lines of stitching **20** and **21** as if the pad were the garment. The pad, however, is substantially larger than the heating element with one embodiment having a heating element of about 10" long and pad dimensions of 11 inches and 4 inches while another embodiment had the same length heating element and a pad of 11 x 8½ inches.

The pad has a pair of layers **31** and **32** formed from thin plastic film such as "Mylar" on which a thin reflected coating of aluminum has been vacuum deposited. The film may be provided with reinforcing lengths of nylon or other thread (not shown). Also, the inner layer **31** is perforated by forming small apertures **31***a* therein at regularly spaced intervals such as on 5/16 inch centers. Interposed between the two layers of film is a layer **33** of interlining material such as fibrous fiber glass or other batting, though if desired, a thin layer of insulating foam may be used instead. The outer layer **34**, i.e., the layer which is placed against the inner surface of the garment **35** is formed from one or more thicknesses of "Staflex" to provide some stiffening for the pad.

An edge binding **36** completely circumscribes the edges of the pad and is secured to the edge portions as by stitches **37**.

In use, the heating element is sewed to the pad by the lines of stitching **20** and **21**, and the pad is sewed to the garment **35** by a line of stitching **38** which extends about the periphery of the pad and preferably passes through

the edge binding 36. Thus, the pad is free from the garment except along its edge portions while the heating element is only secured to the pad.

The heating ribbon 11 may be disposed longitudinally of the pad as indicated in FIG. 7 and the wire 14 extends between the pad and the layer 16. The two wires 14 and 15 extend from a pad to a source of electrical energy such as a battery (not shown). If desired a binding tape may form a tunnel for the wires. It will be understood that the heating element may have a different shape and the pad shaped differently depending on the area of the body desired to be heated and the layer 25 utilized.

The reflective layer of the pad serves to reflect the body heat to decrease its loss while the interlining material minimizes heat loss by conduction. The apertures enable, however, the pad to breathe." Accordingly, in the area of the body where the pad is located, which may be a sensuous area such as the small of the back, the kidney area, the extremities, etc., the insulating pad effects to the user a larger area of warmth as opposed to the rest of the garment while the heating element supplies a concentrated area of warmth.

The use of the two rows of stitching to hold the heating element to the garment enables the element to be secured to flexible, stretchable garments without determent to the heating element or any noticeable loss of stretchability of the garment and limit its stretching only where the heating element is located. As this is only a small part of the garment, it does not interfere with the stretching of the rest of the garment. Also by securing the heating element to the pad and only securing the pad along its outer edges to the garment, the stretching of a garment such as a knit sweater, is not noticeably altered but yet the heating element and pad will not be harmed. Thus, with the present construction, the heating element and the pad may be applied to garments which are desired to stretch with little or no interference with the stretching.

It will accordingly be appreciated that there has been disclosed a heating element for a garment which even though subjected to considerable forces and/or laundry operations does not cause discomfort to the user or decrease the area of contact with the user. The heating element includes a length of thin wide resistance ribbon which is sandwiched between a pair of flexible strips. The strips and ribbon are adhesively secured together to form a unitary assembly. The strips are substantially wider than the ribbon and only have their outer edge portions secured to the garment. Thus even though the garment may move or flex, the strips will flex therewith but the ribbon will continue to present a flat wide side to the user and not be subjected to twisting or crinkling. Moreover, to enhance the sensible heating effect both by minimizing heat loss from the ribbon and from the body, an insulating pad may be employed with the heating element secured only to the pad and the pad being secured to the garment.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A body garment having a heating element to supply heat to a user comprising an elongate strip of electrical resistance ribbon, two strips of flexible material with each strip being elongate and at least as long as said ribbon and having a width larger than the width of the ribbon, one of said strips being positioned on one side of said ribbon and the other strip being positioned on the other side of said ribbon, means adhesively securing together the abutting surfaces of the ribbon and the strips, electrical connecting means connected to said ribbon and extending outwardly from said strips, said strips being substantially wider than the ribbon, stitching means securing only the outer edge portions of the strips to a garment and including a row of stitching extending along each outer edge portion of the strips, said rows being spaced from and on either side of the ribbon, a fabric covering overlaying said element with the rows of stitches also securing said covering to said garment and in which the electrical connecting means includes a length of wire attached to each end of the ribbon, one of said wires being disposed between the fabric covering, the garment and the rows of stitching.

2. A body garment having a heating element to supply heat to a used comprising an elongate strip of electrical resistance ribbon, two strips of flexible material with each strip being elongate and at least as long as said ribbon and having a width larger than the width of the ribbon, one of said strips being positioned on one side of said ribbon and the other strip being positioned on the other side of said ribbon, means adhesively securing together the abutting surfaces of the ribbon and the strips, electrical connecting means connected to said ribbon and extending outwardly from said strips, said strips being substantially wider than the ribbon, stitching means securing only the outer edge portions of the strips to a garment and including a row of stitching extending along each outer edge portion of the strips, said rows being spaced from and on either side of the ribbon and in which there is provided a length of flexible plastic insulating material positioned between said garment and said ribbon with the rows of stitching securing said length to the garment.

3. The invention as defined in claim 2 in which the length of insulating material includes a heat reflective layer and a heat insulating layer with the heat reflective layer being positioned against said heating element.

4. The invention as defined in claim 2 in which the strip of thin insulating material is positioned between the ribbon and one strip and secured to at least said one strip.

5. The invention as defined in claim 4 in which the strip of thin insulating material includes a length of thin flexible plastic material having a reflective layer, said layer being positioned against said ribbon.

6. A body garment having a heating element to supply heat to a user comprising an elongate strip of flat electrical resistance ribbon with said ribbon being substantially wider than thick, two strips of flexible material with each strip being elongate and at least as long as said ribbon and having a width substantially wider than the width of the ribbon, said flexible material being of thin, heat insulating material to decrease spreading of heat from the ribbon, one of said strips being positioned on one flat side of the ribbon and the other strip being positioned on the other flat side of the ribbon to sandwich the ribbon therebetween means adhesively securing the abutting surfaces of the ribbon and the strips, electrical connecting means connected to said ribbon and extending outwardly from the strips and means securing said strips to the body garment and including a row of stitching extending along one edge portion of said strips and another row of stitching extending along the other edge portion of said strips whereby said heating element is secured to the body garment by said spaced rows of stitching and is free of the garment between the rows.

7. The invention as defined in claim 6 in which the body garment is an insulating pad substantially larger than said heating element, said two rows of stitching extending only through said pad and additional stitching securing said pad to another larger body garment, said additional stitching being substantally spaced from the rows of sttching to secure the pad to the another body garment.

8. The invention as defined in claim 7 in which the additional stitching only extends about the peripheral portion of the pad and passes through the pad and at least a part of the another body garment.

9. The invention as defined in claim 7 in which the insulating pad includes at least one layer of plastic film having a reflective surface and a layer of interlining material.

10. The invention as defined in claim **6** in which a strip of fabric tape overlies the two strips of flexible material and in which the rows of stitching pass through the edge portions of the fabric tape.

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VOLODYMYR Y. MAYEWSKY, Primary Examiner

U.S. Cl. X.R.

219—348, 527, 528, 549; 338—212

DECLARATION

STANLEY ARRON, the above-named petitioner, declares that he is a citizen of the United States and resident of Bridgeport, Connecticut, that he verily believes himself to be the original, first and sole inventor of the improvement in ELECTRIC HEATING ELEMENT FOR APPAREL, described and claimed in the foregoing specification; that this application in part discloses and claims subject matter disclosed in his earlier filed pending application Serial No. 597,634, Filed November 29,1966; that, as to the subject matter of this application which is common to said earlier application, he does not know and does not believe that the same was ever known or used before his invention thereof or patented or described in any printed publication in any country before his invention thereof or more than one year prior to said earlier application, or in public use or on sale in the United States more than one year prior to said earlier application; that said common subject matter has not been patented before the date of said earlier application in any country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months prior to said application; and that no application for patent on said invention has been filed by him or his representatives or assigns in any country foreign to the United States, except as follows - none; that, as to the subject matter of this application which is not common to said earlier application, he does not know and does not believe that the same was ever known or used before his invention thereof or patented or described in any printed publication in any country before his invention thereof or more than one year prior to the date of this application, or in public use or on sale in the United States more than one year prior to the date of this application, and that said subject matter has not been patented in any country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months prior to the date of this application; and that no application for patent on said invention has been filed by him or his representatives or assigns in any country foreign to the United States except as follows - none.

The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon. Inventor's full name is STANLEY ARRON.

Stanley Arron

DATE Feb 25, 1969

15 -59-

Plts - Stanley Arrons Exh 11 Sec IA
12/12/18
CL

STANZO ELECTRONIC INDUSTRIES, INC. Item PX-111
P. O. BOX 2100 – BRIDGEPORT, CONN. • AREA CODE 203-374-3600 PX 11

1/5/65

Attn:
Mr. D. Marcus
Shelton Fabricators
Shelton Conn

Dear Sir:

For we are Disclosing our Concepts and Procedures, Secrecy of A Joint Program on the following,
Attached is the Electrical Component "Variable Resistance Pressure Sensitive Device" as requested in your [illegible]

It is understood that there are patents pending on these devices and you will keep these disclosures confidential.

You are hereby licensed to use and conduct experiments for a period of 30 days. Licensee agrees it will not manufacture articles for sale or sell any article embodying the use of these Pressure Variable Sensitive Devices without first securing written consent from us.

At the end of 30 days, licensee has the right to a license for uses of the devices on mutually agreeable terms and a reasonable royalty.

Very truly yours,

STANZO ELECTRONIC INDUSTRIES, INC.

Alexander W. [illegible]

Stanley Arron
Executive Vice President

SA/ms
att.

182

DEALCO ELECTRONICS
LABORATORY:
ROXBURY, CONN.

COOK-RAY STOVES
BATTERIES
TRANSFORMERS
CABLE
AEROSOLS

•

VARIABLE
RESISTANCE SWITCHES
PRESSURE SENSITIVE
MOTOR CONTROLS
LIGHT CONTROLS

PLAINTIFF'S EXHIBIT

Pltfs - Stanley - drawings Exh. 13 for ID
12/30/63
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STANZO ELECTRONIC INDUSTRIES, INC. PX-13

P. O. BOX 2186 — BRIDGEPORT, CONN. • AREA CODE 203-374-3600

Dec 21st 1962

A L Gloston
President
Crestline Fabrics
Dan St.
S. Norwalk, Conn

Dear Sir:

This BC H. BELT is a device on which a patent is pending and is being disclosed to you for the purpose of giving you a license or selling you a finished product on my Custom Fabric

If, after an evaluation, you are not interested, please return the with your comments.

It is understood that you will keep this disclosure confidential.

Very sincerely yours,

STANZO ELECTRONIC INDUSTRIES, INC.

Stanley Arron
Exec. Vice President

SA/hmz

STANZO ELECTRONICS

LABORATORY: ROXBURY, CONN.

COOK-RAY STOVES
BATTERIES
TRANSFORMERS
CABLE
AEROSOLS

VARIABLE RESISTANCE SWITCHES
PRESSURE SENSITIVE MOTOR CONTROLS
LIGHT CONTROLS

12/3. 67
C.L.

A PX-23
EX 23

STANZO ELECTRONIC INDUSTRIES, INCORPORATED
P.O. Box 2186-10 Seymour Street-Bridgeport, Conn.
Area Code 203-336-1788

CONFIDENTIAL DISCLOSURE AGREEMENT

1. [illegible] INC. is hereby disclosing details of its [illegible] It is understood that this product is new, unique and unknown in industry; that these disclosures are trade secrets and will be kept confidential.

2. [illegible] states that they will not disclose any information about the product (or product designs) to a third party, nor will they undertake to make (or have made for them) the product without a written permission from STANZO ELECTRONIC INDUSTRIES, INC.

3. Upon viewing the above product (or product designs) [illegible] shall state immediately whether these products conflict with any products that the company is developing, or has developed in the past to a comprehensive state of completion, and such products will be shown. If a conflict is shown to exist, then this agreement need not be concluded.

4. It is the purpose of this agreement to negotiate a mutually agreeable contract for your use of the above product.

5. Acceptance or rejection of the product (or product designs) shall be made within 10 days after submission.

6. In the event the party being shown this product must disclose it to another party for purposes of negotiations, he hereby records that

   a) He is to show it to _____ only.

   b) He will have the other party sign this same Confidential Disclosure Agreement in advance of being shown the product and will return a signed copy to us.

   c) Permission to disclose this product to any other parties will be obtained in advance.

Accepted by:

[illegible] Company

[illegible]

Date of signing: [illegible]

STANZO ELECTRONIC INDUSTRIES, INC.

[illegible]
Stanley Arron
Executive Vice President

183

Pltfs- Ex. 28 Ltr
12/2/68
TL.

to Regnery Co "

July 30, 1968

TO: BEN J. WATTENBERG
FROM: ST. MARY

The periodical "Capital Chronicle" issue for August 1968 just received by us. It features articles on both Goldwater and Calvert Magruder. The idea is that they are both Libertive fields and [illegible] products dealers should get into them.

You should be sure that Gibbons reads it. I am sending you the important front section of the Chronicle, [illegible].

I think I mentioned that I had seen to you. It is very important that I read it out loud, but it [illegible] capitol for it. The person who [illegible] Zeilenga just called me on it. He wants to use the final article and give me an order. Union Carbide is interested in publishing it (at [illegible] it for use with their branches. [illegible] per year on this item. [illegible] up with figures of 1, 10, 100 [illegible] can do what we [illegible] do. This result [illegible] above is [illegible].

You should have that of particularly effective [illegible] Magruder. He was called a "new [illegible]" by Gil Troy [illegible].

K-R PX-30 Plfs - S.A.'s Exh. 30 D. Ct. 12/30/68 EL EX 30

AGREEMENT made and entered into this day of May, 1965 between STANZO ELECTRONIC INDUSTRIES, INC., a corporation having an office at 10 Seymour Street, Bridgeport, Connecticut (hereinafter called "Stanzo") and KAYSER-ROTH CORPORATION, a New York corporation having an office at 425 Fifth Avenue, New York, New York 10016 (hereinafter called "K-R").

WITNESSETH:

WHEREAS, Stanzo is the exclusive owner of all right, title and interest in and to a certain new and useful invention (hereinafter called the "Invention") relating, in pertinent part, to socks with a heating element powered by a battery unit self-contained in the socks, and intends filing a patent application in the United States Patent Office with respect to the Invention, and

WHEREAS, Stanzo manufactures the electronic components for the Invention, and

4/14/65 EXHIBIT "A"

WHEREAS, K-R manufactures socks and desires to manufacture, market, sell, exploit, enjoy and otherwise commercialize the Invention jointly with Stanzo under the terms and conditions hereinafter set forth.

NOW, THEREFORE, the parties mutually agree as follows:

1. K-R shall form a corporation ~~or set up a division~~ to sell, market and exploit the Invention as applied to socks, ~~such decision to be in K-R's sole discretion.~~ as actually agreed to. Said corporation ~~or division~~ shall hereinafter be referred to as "Warmsox." ~~In the event that a corporation is formed,~~ K-R shall cause said corporation to enter into a licensing agreement under the same terms as provided herein.

2. ~~Stanzo~~ RC shall diligently file and prosecute a patent application in the United States Patent Office with respect to the Invention and make every effort to obtain a patent thereon. ~~Stanzo~~ RC shall also file patent applications with respect to the Invention in such foreign countries as K-R may request. Warmsox shall be responsible for all costs & foreign patent

3. The term of this agreement shall be for a period of

Determine & Pay

ten (10) years commencing the date of execution, subject to termination as provided below.

4. ~~Stanzo~~ KC hereby grants to Warmsox the exclusive world-wide right and license to commercialize and exploit the Invention insofar as it relates to socks, and any improvements thereon, during the term of this agreement. This exclusive right and license herein granted shall apply to all inventions, improvements, patent applications or patents which Stanzo now owns or controls, or shall hereafter own or control, relating to the Invention as applied to socks, including all "know-how," engineering data, copies of drawings and sketches and such other information as Stanzo now or may hereafter acquire with respect to the Invention.

5. (a) Stanzo shall supply Warmsox's requirements of the electronic components of the Invention during the term of the agreement at Stanzo's cost of manufacture, which shall be its actual cost in accordance with current and accepted accounting practices. In the event that Stanzo cannot supply all said requirements or in the event its prices are not competitive, Warmsox shall have the right to purchase said elements from others.

(b) K-R shall supply to Warmsox during the term of

this agreement its requirements of socks necessary to complete the Invention at k-R's cost of manufacture, which shall be its actual cost in accordance with current and accepted accounting practices. The foregoing cost of manufacture shall include the cost of attaching the electronic components to the socks.

6. Warmsox shall deliver its entire output of the Invention to K-R as follows:

(a) To branded divisions of K-R, including but not limited to, Esquire, Interwoven, Mojud, Kayser, Schiaparelli and Sapphire, at forty per cent (40%) off the wholesale list price of said divisions to their customers.

(b) To unbranded divisions of K-R at twenty per cent (20%) off the wholesale list price of said divisions to their customers.

7. "Profits" of Warmsox as referred to in this agreement shall mean the proceeds received from the divisions of K-R, as provided in Paragraph 6 above, less the cost of the completed socks

embodying the Invention as referred to in Paragraph 5 above, cost of samples and all applicable taxes.

8. Warmsox shall pay ~~to Stanzo~~ a guaranteed minimum royalty for the license granted herein of Twenty Five Thousand Dollars ($25,000.) for the first contract year payable on the signing of this agreement, plus one-half of the cumulative profits of Warmsox as defined in Paragraph 7 above, in excess of Twenty Five Thousand Dollars ($25,000.).

9. The parties shall maintain such books and records as are reasonably necessary for the computation of the cost and payments payable hereunder. Each party shall have the right to inspect such books and records of any other party where located upon reasonable notice to said party. Warmsox shall furnish ~~Stanzo~~ and K-R with quarterly reports within thirty (30) days after the end of each quarter containing information as to its operations during the preceding contract quarter, and simultaneously therewith pay ~~Stanzo any royalties~~ due under Paragraph 8 above.

10. ~~Stanzo~~ represents that ~~it is~~ the exclusive owner

of all right, title and interest in the Invention and has the right to enter into this agreement and the license granted hereunder; that the Invention is secret and has not been revealed to anyone except Adler Sock Company and ~~Stanzo~~'s attorney..

R.C.

11. ~~Stanzo~~ agrees to furnish to Warmsox and K-r so far as is reasonably possible "know-how," engineering data, copies of drawings and sketches and such other information as it now or may hereafter acquire with respect to the Invention for the assistance of Warmsox and K-R in operating under this agreement. ~~Stanzo~~ shall not disclose said information to any other person during the term of this agreement without the prior written consent of Warmsox and K-R;

R.C.

12. During the term of ~~this agreement~~ and the license herein granted, K-R and Warmsox admit the validity, patentability, novelty and utility of the Invention and the right, title, and interest of ~~Stanzo~~ thereto. It will not directly or indirectly attack or assist another in attacking the validity of any patent or patents which may issue thereon.

R.C.

13. ~~Stanzo~~ agrees that if a patent is not issued with

respect to the Invention or if the claims of any patent issued with respect thereto are declared invalid by judgment or decree of a court of last resort or of a lower court from whose decision no appeal is seasonably taken, K-R may, at its option, cancel this agreement by notice to ~~Stanzo~~ RC and be relieved of all liability or obligation hereunder, and K-R shall have the same right to the use of the Invention as any third party.

14. ~~Stanzo~~ RC agrees to defend and hold K-R and Warmsox harmless with respect to any claims or suits for patent infringement by reason of Warmsox and K-R manufacturing, selling, or using the Invention. K-R and/or Warmsox ~~may~~ will, at their expense, participate in the defense of any said action with attorneys ~~of their own choosing~~ mutually agreed upon, but ~~Stanzo~~ Warmsox RC shall bear primary responsibility for said defense.

Agreed

15. In the event that there shall be an infringement of the Invention or any patent that may issue thereon by third parties, K-R and Warmsox shall ~~have the right, at their option, to~~ bring an action for infringement in the name of ~~Stanzo~~ RC and ~~Stanzo~~ RC shall

cooperate fully with K-R and Warmsox for such purposes and hereby nominates K-R and Warmsox as its agents and representatives to bring such action or actions. All expenses of such action shall be a cost of manufacture of the Invention for purposes of computing the profits as provided in Paragraph 8 above. Any recovery by K-R or Warmsox, shall be paid to Warmsox and shall reduce the aforesaid cost of manufacture of the Invention.

16. Notwithstanding the provisions of Paragraph 4, in the event that Warmsox does not sell at least five thousand (5,000) dozen pair of socks embodying the Invention during any contract year of the term hereof, ~~Stanzo~~ RC & SA shall have the right to terminate this agreement on ninety (90) days' written notice to K-R and Warmsox given within thirty (30) days after receipt of the final statement for said contract year. Any inventory of the Invention on hand at the date of termination shall first be offered to ~~Stanzo~~ RC & SA at the cost of manufacture and in the event ~~Stanzo~~ RC & SA does not purchase said inventory, Warmsox and/or K-R shall have the right to dispose of same subject to the terms and conditions of this agreement.

17. It is the specific agreement of the parties that upon expiration or termination of ~~this agreement~~ the Patent K-R shall be free to manufacture, use and sell the Invention subject to no greater prohibition or restriction by virtue of the execution of this agreement than any other manufacturer or seller not a party hereto.

18. All notices provided for in this agreement shall be given in writing and shall be considered duly served and given by mailing the same, postage prepaid, by certified mail, return receipt requested, to the parties at the following addresses:

Stanzo:

K-R & Warmsox: c/o Harold L. Glasser, Esq.
425 Fifth Avenue
New York, New York 10016

MU 3-6992

19. Any controversy or claim arising out of, or relating to, this agreement, or the breach thereof, shall be settled by arbitration. Such disagreement shall be referred to three (3) arbitrators, one to

be appointed by each party and the third to be appointed by the two (2) appointed by the parties; and the award in writing signed by any two of them shall be final, conclusive and binding upon the parties. The arbitration shall be held in New York City, New York and the award shall be made within sixty (60) days after the reference to the said arbitrators. In the event that the two (2) arbitrators appointed by the parties cannot agree on a third arbitrator within a period of fifteen (15) days, the third arbitrator shall be appointed by the American Arbitration Association. If either party shall refuse or neglect to appoint an arbitrator within thirty (30) days after the other shall have appointed an arbitrator and served written notice thereof upon the other requiring him to appoint an arbitrator, then the arbitrator so appointed by the first party shall have the power to proceed to arbitrate and determine the matters of disagreement as if he were an arbitrator appointed by both the parties hereto for that purpose and his award in writing signed by him shall be final, conclusive and binding upon both parties. The parties hereto consent to the issuance of a judgment confirming the award of the arbitrator

or arbitrators by any court having jurisdiction thereof.

20. This agreement shall be interpreted under and in accordance with the laws of the State of New York wherein it has been made.

21. This agreement cannot be modified, changed or discharged except by writing duly executed by the parties hereto.

22. ~~Nothing herein contained~~ This shall be construed to regard the parties hereto as ~~being partners or~~ joint venturers, ~~or~~ to constitute ~~the arrangement~~ the Corporation owned 50% KK, 25% RC, 25% SA herein provided for as a partnership or joint venture.

11 dally init

IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above written.

Raffael Costanzo

Stanley Aaron

~~STANZO ELECTRONIC~~ INDUSTRIES, INC.

By _____

By _____

KAYSER-ROTH CORPORATION

By _____

Rights in what Does Warner Et - Exhibit Contribution Missing
Last License comes from Key Costings
Less Warner to Mailing + US Dist Direct
Advertising 5% to be Split

Warner Corporate Structure 50% of Shares to KR
25% to SA
25 to RC

Equal Voting
" Participation
Equal Profits
~~Partnership~~ Joint Venture
Sample Cost Not same as Production Costs
~~Mail Order Rights, Goodwill~~
Minimum 5M Dozen yards - 10% ~~not~~ Wholesale (5% to RC 5% to SA)
~~All Rights Revert to RC after 10~~

Shoe Rights

KR Provide all financing for production, Marketing Samples, & Establishing warehouse & cost of distribution
Can Show to Advertising Agency if they ~~Can Only~~ Can only come with us

(1) If Original Contract ~~Not~~ fulfilled the 30 days we have Equitable Agreement as Planned
If No agreement Can Summarily Recover our Attorneys Fees

(2) 1/2 of 25M after trial of 2 Sor for 30 Days Whatever will start on as many Samples as you wish

(3) after 30 Days if Buy Bad Bad ~~Not~~ Not

Insist on 30 Days

Don't breach (Sue) attach Chattels if not available

Option ~~for~~ of Warner Disclosure - will not Accept Changes will not go to Court on Restriction on Stock

No Agency Clause
RC #11 Does not want Agency after 10 yrs. Want to revert to 3rd Party Sales

Termination Clause - never

127A RAPHAEL COSTANZO = R.C. PIB. S.A. Ex. 33 & 7 12/3-16 G.L.

m PX-33

Source.

TYPE IN TRIPLICATE

AGREEMENT made and entered into this 14 day of May, 1965 between STANZO ELECTRONIC INDUSTRIES, INC., a ~~corporation having an office at 10 Seymour Street~~, Bridgeport, Connecticut (~~hereinafter called "Stanzo")~~ and KAYSER-ROTH ~~CORPORATION, a New York corporation having an office at~~ 425 Fifth Avenue, New York, New York 10016 (~~hereinafter called "K-R")~~.

RAPHAEL COSTANZO of 117 PARK ST and RICHARD S MARCUS of 36 CURTIS TERR FAIRFIELD, CONN

WITNESSETH:

R.C.C.

WHEREAS, Stanzo is the exclusive owner of all right, title and interest in and to a certain new and useful invention (hereinafter called the "Invention") relating, in pertinent part, to socks with a heating element powered by a battery unit self-contained in the socks, ~~and intends filing~~ has filed for a patent application in the United States Patent Office with respect to the Invention, and

WHEREAS, Stanzo manufactures the electronic components for the Invention, and

4/14/65 EXHIBIT "A"

(1)

WHEREAS, ~~K-R manufactures socks and~~ RICHARD S. MARCUS desires to manufacture, market, sell, exploit, enjoy and otherwise commercialize the Invention jointly with ~~Stanzo~~ RC under the terms and conditions hereinafter set forth.

NOW, THEREFORE, the parties mutually agree as follows:

1. ~~K-R~~ RC & RSM shall form a ~~corporation or set up a division~~ LIMITED PARTNERSHIP to sell, market and exploit the Invention as applied to socks, ~~such decision to be in K-R's sole discretion.~~ Said ~~corporation or division~~ LIMITED PARTNERSHIP shall ~~hereinafter~~ be referred to as "~~Warmson~~ THE WARMSOX COMPANY. ~~In the event that a corporation is formed, K-R shall cause said corporation to enter into a licensing agreement under the same terms as provided herein.~~ IT IS AGREED RC IS RECEIVING OF ALL FINANCIAL RESPONSIBILITY AND LOSSES, AND SHALL MAKE NO PURCHASES OR ACQUISITIONS WITHOUT PERMISSION OF RICHARD S. MARCUS. ALL NECESSARY WARNINGS, LOANS OF RICHARD S. MARCUS TO THE WARMSOX COMPANY, WILL BE HIS

2. RC ~~Stanzo shall diligently file and~~ prosecute ~~a~~ patent application in the United States Patent Office with respect to the Invention and make every effort to obtain a patent thereon. ~~Stanzo~~ RC shall also file patent applications with respect to the Invention in such foreign countries as ~~K-R~~ RSM may request. The partnership will pay the cost of all patent applications. If necessary will loan the necessary monies to the partnership

3. ~~The term of this agreement shall be for a period of~~ annual interest,

~~4/15/65~~

~~ten (10) years commencing the date of execution, subject to termination as provided below.~~

4. ~~Stanzo~~ (RC) hereby grants to ~~Warmsox~~ R.S. HARRIS the exclusive world-wide right and license to commercialize and exploit the Invention insofar as it relates to socks, and any improvements thereon, ~~during the term of this agreement~~. This exclusive right and license herein granted shall apply to all inventions, improvements, patent applications or patents which ~~Stanzo~~ RC now owns or controls, or shall hereafter own or control, relating to the Invention as applied to socks, including all "know-how," engineering data, copies of drawings and sketches and such other information as ~~Stanzo~~ RC now or may hereafter acquire with respect to the Invention.

5. (a) Stanzo shall supply Warmsox's requirements of the electronic components of the Invention during the term of the agreement at Stanzo's cost of manufacture, which shall be its actual cost in accordance with current and accepted accounting practices. In the event that Stanzo cannot supply all said requirements or in the event its prices are not competitive, Warmsox shall have the right to purchase said elements from others.

~~(b) K-R shall supply to Warmsox during the term of~~

this agreement its requirements of socks necessary to complete the Invention at k-R's cost of manufacture, which shall be its actual cost in accordance with current and accepted accounting practices. The foregoing cost of manufacture shall include the cost of attaching the electronic components to the socks.

6. Warmsox shall deliver its entire output of the Invention to K-R as follows:

(a) To branded divisions of K-R, including but not limited to, Esquire, Interwoven, Mojud, Kayser, Schiaparelli and Sapphire, at forty per cent (40%) off the wholesale list price of said divisions to their customers.

(b) To unbranded divisions of K-R at twenty per cent (20%) off the wholesale list price of said divisions to their customers.

"Profits" of ~~Warmsox~~ the Partnership as referred to in this agreement shall mean the NET proceeds received by the Partnership ~~from the divisions of K-R, as provided in Paragraph 6 above~~, less the cost of the completed socks, less ~~sales commissions~~, advertising, cost of samples, ~~tapes of all types~~, book interest, ~~and~~ all other expenses ~~4/15/65~~ in accordance with current and accepted accounting practices. ALL MONIES AND CAPITAL PUT INTO THE BUSINESS BY RICHARD S. MARCUS SHALL ALWAYS REMAIN THE PROPERTY OF RICHARD S. MARCUS.

delete

~~embodying the Invention as referred to in Paragraph 5 above,~~ ~~cost of samples and all applicable taxes;~~

~~8.~~ Warmsox shall pay to Stanzo a guaranteed minimum royalty for the license granted herein of Twenty Five Thousand Dollars ($25,000.) for the first ~~contract year~~ payable on the signing of this agreement, plus one-half of the cumulative profits of Warmsox as defined in Paragraph 7 above, in excess of Twenty Five Thousand Dollars ($25,000.).

~~9.~~ The parties shall maintain such books and records as are reasonably necessary for the computation of the cost and payments payable hereunder. Each party shall have the right to inspect such books and records of any other party where located upon reasonable notice to said party. RSH ~~Warmsox~~ shall furnish ~~Stanzo and K~~ RC with quarterly reports within thirty (30) days after the end of each quarter containing information as to ~~its~~ HIS operations ~~during~~ THE WARMSOX COMPANY the preceding contract quarter, and simultaneously therewith pay EACH PARTNER 50% OF ALL PROFITS FOR that QUARTER UNLESS otherwise ~~Stanzo any royalties due under Paragraph 8 above.~~ DURING agreed.

~~10.~~ ~~Stanzo~~ RC represents that it is the exclusive owner

~~4/15/65~~

of all right, title and interest in the Invention and has the right to enter into this agreement and the license granted hereunder; ~~that the Invention~~ is secret ~~and has not been revealed to anyone except Adler~~ Sock Company and Stanzo's attorney.

~~15.~~ RC ~~Stanzo~~ agrees to furnish to RSM ~~Warmsox and K-R~~ so far as is reasonably possible "know-how," engineering data, copies of drawings and sketches and such other information as it now or may hereafter acquire with respect to the Invention for the assistance of RSM ~~Warmsox and K-R~~ in operating under this ~~agreement.~~ partnership RC ~~Stanzo~~ shall not disclose said information to any other person during the term of this ~~agreement~~ partnership without the prior written consent of R.S.M. ~~Warmsox and K-R.~~ RC is not to be responsible for information that is leaked out by others.

~~16.~~ During the term of this ~~agreement~~ partnership and the license herein granted, ~~K-R and Warmsox~~ R.S.M. admit the validity, patentability, novelty and utility of the Invention and the right, title, and interest of RC ~~Stanzo~~ thereto. ~~It~~ HL will not directly or indirectly attack or assist another in attacking the validity of any patent or patents which may issue thereon.

~~17.~~ RC ~~Stanzo~~ agrees that if a patent is not issued with

~~4/15/65~~

respect to the Invention or if the claims of any patent issued with respect thereto are declared invalid by judgment or decree of a court of last resort or of a lower court from whose decision no appeal is seasonably taken, ~~K-R~~ R.S.M may, at ~~its~~ his option, ~~cancel~~ dissolve this partnership agreement by notice to ~~Stanzo~~ R.C. and be relieved of all liability or obligation hereunder, and ~~K-R~~ R.S.M shall have the same right to the use of the Invention as any third party. However R.C. TRADE SECRETS CANNOT BE USED WITHOUT HIS CONSENT.

14. Stanzo agrees to defend and hold K-R and Warmsox harmless with respect to any claims or suits for patent infringement by reason of Warmsox and K-R manufacturing, selling, or using the Invention. K-R and/or Warmsox may, at their expense, participate in the defense of any said action with attorneys of their own choosing, but Stanzo shall bear primary responsibility for said defense.

15. In the event that there shall be an infringement of the Invention or any patent that may issue thereon by third parties, ~~K-R and Warmsox~~ R.S.M shall have the right, at ~~their~~ his option, to bring an action for infringement in the name of ~~Stanzo~~ R.C. and ~~Stanzo~~ R.C. shall

~~4/24/65~~

R.S.M

cooperate fully with ~~K-R and Warmsox~~ for such purposes and

R S M

hereby nominates ~~K-R and Warmsox~~ as its agents and representatives

to bring such action or actions. All expenses of such action shall

be a cost of manufacture of the Invention for purposes of computing

the profits, ~~as provided in Paragraph 8 above~~. Any recovery by ~~K-R~~ R.S.M

~~or Warmsox~~, shall be paid to ~~Warmsox and shall reduce the aforesaid~~ THE PARTNERSHIP AFTER DEDUCTING ALL

~~cost of manufacture of the Invention.~~ LEGAL EXPENSES AND COSTS INCURRED BY R.S.M.

16. Notwithstanding the provisions of Paragraph 4, in the event that Warmsox does not sell at least five thousand (5,000) dozen pair of socks embodying the Invention during any contract year of the term hereof, Stanzo shall have the right to terminate this agreement on ninety (90) days' written notice to K-R and Warmsox given within thirty (30) days after receipt of the final statement for said contract year. Any inventory of the Invention on hand at the date of termination shall first be offered to Stanzo at the cost of manufacture and in the event Stanzo does not purchase said inventory, Warmsox and/or K-R shall have the right to dispose of same subject to the terms and conditions of this agreement.

~~2/14/65~~

~~17.~~ It is the specific agreement of the parties that upon ~~expiration or~~ termination of this ~~agreement K-R~~ PARTNERSHIP R.S.M shall be free to manufacture, use and sell the Invention subject to no greater prohibition or restriction by virtue of the execution of this agreement than any other manufacturer or seller not a party hereto, apart THAT TRADE SECRETS CANNOT BE USED WITHOUT HIS PERMISSION.

~~18.~~ All notices provided for in this agreement shall be given in writing and shall be considered duly served and given by mailing the same, postage prepaid, by ~~certified~~ REGISTERED mail, return receipt requested, to the parties at the following addresses:

~~Stanco~~: R.C. - - - - -
119 PARK ST
BRIDGEPORT, CONN

~~K-R-S Wormsox~~: ~~c/o Harold L. Glasser, Esq.~~
~~425 Fifth Avenue~~
~~New York, New York 10016~~

RICHARD S. MARCUS
6 CURTIS PLACE
FAIRFIELD, CONN

19. Any controversy or claim arising out of, or relating to, this agreement, or the breach thereof, shall be settled by arbitration. Such disagreement shall be referred to three (3) arbitrators, one to

delete

~~4A-2165~~

9.

CONSULTING AND ENGINEERING SERVICES TO BE RENDERED BY R.C. ~~N-K-S-M~~
GETTING THE WARMSOX COMPANY INTO PRODUCTION, R C
DRAW UP TO $100.00 PER WEEK SALARY AGAINST HIS
OF FUTURE PROFITS OF THE WARMSOX COMPANY
TING 21 DAYS AFTER SIGNING OF THIS agreement.

delete

be appointed by each party and the third to be appointed by the two (2) appointed by the parties; and the award in writing signed by any two of them shall be final, conclusive and binding upon the parties. The arbitration shall be held in New York City, New York and the award shall be made within sixty (60) days after the reference to the said arbitrators. In the event that the two (2) arbitrators appointed by the parties cannot agree on a third arbitrator within a period of fifteen (15) days, the third arbitrator shall be appointed by the American Arbitration Association. If either party shall refuse or neglect to appoint an arbitrator within thirty (30) days after the other shall have appointed an arbitrator and served written notice thereof upon the other requiring him to appoint an arbitrator, then the arbitrator so appointed by the first party shall have the power to proceed to arbitrate and determine the matters of disagreement as if he were an arbitrator appointed by both the parties hereto for that purpose and his award in writing signed by him shall be final, conclusive and binding upon both parties. The parties hereto consent to the issuance of a judgment confirming the award of the arbitrator

IF THE INVENTION PROVES TO BE OF LITTLE VALUE IN THE OPINION OF R.S.M. THEN R.S.M. HAS THE RIGHT TO DISSOLVE THE PARTNERSHIP.

or arbitrators by any court having jurisdiction thereof.

10. This agreement shall be interpreted under and in accordance with the laws of the State of ~~New York~~ CONNECTICUT wherein it has been made.

11. This agreement cannot be modified, changed or discharged except by writing duly executed by the parties hereto.

12. Nothing herein contained shall be construed to regard the parties hereto as being partners or joint venturers, or to constitute the arrangement herein provided for as a partnership or joint venture.

IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above written.

R. C.
STANZO ELECTRONIC INDUSTRIES, INC.

By_____

KAYSER-ROTH CORPORATION

By_____
RICHARD SHELDON MARCUS

ATT#165

PX - 101

STANZO ELECTRONIC INDUSTRIES, INC.

P. O. BOX 2186 – BRIDGEPORT, CONN. • AREA CODE 203-374-3600

12/17/64

Mr Irving Goodman
Colonial Realty
Saguin Drive
Dansfield

STANZO ELECTRONICS

LABORATORY:
ROXBURY, CONN.

COOK-RAY STOVES
BATTERIES
TRANSFORMERS
CABLE
AEROSOLS

•

VARIABLE
RESISTANCE SWITCHES
PRESSURE SENSITIVE
MOTOR CONTROLS
LIGHT CONTROLS

Dual Voltage Concept
This Shovel Type Defroster ~~Glass~~ like a device, on which a patent is pending and is being Disclosed to you for the purpose of ~~giving you a license or selling you a finished product.~~ Absolutely Refrigerating us in Keeping Confidential

If, after an evaluation, you are not interested, ~~please return the~~ with your ~~comments.~~

It is understood that you will keep this disclosure confidential.

Very sincerely yours,

STANZO ELECTRONIC
INDUSTRIES, INC.

Stanley Arron
Exec. Vice President

SA/hmz

Pfs-S.J.'s Exh. 49 for Id. 12/3/68 E.L.

Dx-G49

49

PX-49

A G R E E M E N T

THIS AGREEMENT entered into this 24th day of September, 1965 by and between STANLEY ARRON of 3323 Old Town Road, Bridgeport, Connecticut (herein called "Arron") and SENECA KNITTING MILLS CO., INC., a corporation existing under the laws of the State of and having a place of business at 450 7th Avenue, New York City, New York (herein called "Seneca"),

WITNESSETH:

WHEREAS, Arron is skilled in the art of design, manufacture and sales of socks having electric heating elements (herein called "heated socks") and possesses technical information and know-how (herein called "knowledge") and patent rights relating thereto, and

WHEREAS, Seneca is desirous of obtaining the knowledge and rights under the patent rights of Arron and to commence production and sale of heated socks

NOW, THEREFORE, the parties have agreed as follows:

1. Arron will immediately make available to Seneca his knowledge and skill to enable Seneca to initiate manufacture and sale of heated socks.

2. Arron agrees to grant and hereby grants to Seneca a ~~non~~-exclusive license to make, use and sell heated socks under any and all patent rights which he possesses or will possess relating to heated socks. Any of said rights granted shall be co-extensive with the duration of this

9/24/65 Change it to exclusive (A)

Agreement and shall terminate upon termination of this Agreement.

3. Arron agrees to supply to Seneca all of Seneca's needs of the electric heating part of said heated socks including as a unitary part a length of resistance wire, conductors connected thereto and connectors on the ends of the conductors; and Seneca agrees to purchase all of its needs of said heating part from Arron.

4. Arron agrees to supply to Seneca two hundred (200) of the electrical heating part of heated socks within one month of the date of this Agreement. Seneca agrees to pay Arron upon receipt of the two hundred (200) heating parts a sum equal to the actual costs to Arron of making the two hundred parts.

5. Seneca agrees to use its best efforts to manufacture and sell heated socks and to initiate same with the execution of this Agreement.

6. Seneca agrees to pay Arron the remainder of the monies received from the sale of heated socks; said remainder being the amount of Seneca's net sales of heated socks less (a) Seneca's manufacturing costs thereof including but not

It is agreed that the manufacturing costs and selling commissions shall in no event unless agreed to by the parties exceed comparable business practices and/or competitive prices.

7. Seneca agrees to pay Arron fifteen (15) days after the first of each month, the monies due under the provisions of paragraph 6 for the preceding month, and to furnish Arron with sufficient information for Arron to verify the accuracy of said sum if requested by Arron. $10c from Seneca to Arron is acknowledged. $400 on account of 3 Salesmans Loan to be paid to Arron & Plan to be Declared Thereafter.

8. In the event that the remainder due Arron each month, according to the provisions of paragraphs 6 and 7, shall be less than one-half of the sum of the 15% profit of item (a) and the 8% profit of item (b), then Seneca agrees to pay Arron in place of the remainder an amount equal to one-half of the sum of the 15% and the 8% profit.

9. Seneca agrees to (a) sell twenty-five thousand (25,000) pairs of heated socks during the year from September 1, 1965 to August 31, 1966; or (b) sell in each year thereafter beginning on September 1st, one hundred thousand (100,000) pairs of heated socks.

10. This Agreement shall extend from year to year unless otherwise terminated according to the termination provisions of paragraph 9 or by breach of any one of the agreements or covenants contained herein.

Any breach of the terms and conditions of this Agreement by either party or default in the performance of this Agreement by either party shall be grounds for the other party

hereto to cancel this Agreement, provided, however, said other party shall first give to the breaching or defaulting party thirty (30) days written notice specifying the breach or default and of its intention to cancel the Agreement, and such cancellation shall be effective only if the breaching party remains in default at the end of said thirty (30) day period.

11. Seneca agrees that in the event that this Agreement is terminated, that it will not manufacture and/or sell for a period of five years subsequent to the termination, heated socks.

12. The Seneca net sales shall be the gross selling price of heated socks less the usual trade discounts, less any taxes which might be included in the gross selling price, less allowances for goods returned and less adjustments for defects in goods; and heated socks shall be considered sold when billed out or if not billed out then when delivered, shipped or mailed.

13. Seneca agrees to keep full and accurate records of accounts of the sales and shipments of all heated socks and further agrees to have its records and accounts examined by Arron or his duly authorized representative to the extent necessary to verify the accuracy of all statements and monies due hereunder, such examination to be made from time to time at the discretion and expense of Arron.

14. Seneca agrees that it will use its best efforts and all reasonable precautions to keep secret and confidential within its own organization said knowledge supplied to it or by Seneca's operation under this Agreement for the duration

of this Agreement and if terminated for a period of five (5) years from the date of termination.

15. This Agreement is non-transferable by Seneca but is extendible by Seneca to any related company in which Seneca controls at least a majority interest. Seneca agrees that if this Agreement is extended to such a related company that such a related company accepts and agrees to the herein covenants and agreements of Seneca and will be bound thereby and that Seneca will not be released from its covenants and agreements.

16. In the event of the receivership, bankruptcy, liquidation or the cancellation of the corporate charter of Seneca, this Agreement shall immediately terminate and all of the rights granted Seneca hereunder shall revest in Arron.

Termination in any manner shall in no way affect the rights of Arron to accrued monies hereunder.

17. This instrument contains the entire agreement between the parties in reference to the subject matter hereof, there being no other considerations, conditions or covenants not expressly stated herein, and may not be altered or changed except by an instrument in writing duly executed by the parties hereto.

18. This Agreement shall be binding upon and inure to the benefit of the heirs, successors and assigns of the parties.

IN WITNESS WHEREOF, STANLEY ARRON, by his own hand, and SENECA KNITTING MILLS CO., INC., by its officer thereunto

duly authorized, have caused this instrument to be executed in duplicate as of the day and year first above written.

STANLEY ARRON

SENECA KNITTING MILLS CO., INC.

By _____ Vice-President

ATTEST:

~~Secretary~~
Witness

State of :
: ss.
County of :

On this _____ day of _____, 1965, before me, a Notary Public, personally appeared Stanley Arron, to me known and known by me to be the person who executed the foregoing agreement, and to me acknowledged that he executed the same, and that the same is his free act and deed as and for

XXXXX
XXX-XX

Jan 4,1965

Box TFX 5947
New York Times
Times Square
New York,N.Y.

Gentlemen:

We have patented heating element which enables us to create heat more efficiently on low voltages and automobile batteries.

One of our [illegible] been placed with a leading manufacturer of Marine products. We now have the following items ready for marketing.....

[illegible] - Rear defrosters that work out of the cigarette lighter. Developed because of a recognized need and large markets for products of this type.

Travel Trailers - Low voltage electric stoves to replace the existing gas and alcohol units now being used.

[illegible] - We have been called in to design a better box and heating element and will be able to sell the complete package in many instances or limit our activities to making the box only,depending on financing arrangements.

We have developed some similar items. All these have a large potential and the nation's largest retailer is very interested in this field and it's potential.

All the above have patents or patents pending. We would be very happy to meet with you and go into more detail on the above programs.There is a lot of money to be made because these items are all timely, no more than could be done previously and are markets that can be reached with a minimum of expense.

Sincerely Yours,

STANCO ELECTRONIC INDUSTRIES INC

Stanley Tyson
Exec.V.P.

SA/ha

REGISTERED NO. 2003

PX-

DX6

EX 96

STANZO ELECTRONIC INDUSTRIES, INC.
P. O. BOX 2186 – BRIDGEPORT, CONN. • AREA CODE 203-374-3600

Arm Dept.
#97-A
ajc 12-8-64

December 18,1964

TO WHOM IT MAY CONCERN:

This is to record certain concepts and processes developed this year on which we are in process of filing patents and have negotiated with certain parties for representation and liscensing. Consequently, disclosures and exposures have been made and this letter is to establish and confirm dates on the above.

STANZO ELECTRONICS
LABORATORY:
ROXBURY, CONN.

COOK-RAY STOVES
BATTERIES
TRANSFORMERS
CABLE
AEROSOLS

•

VARIABLE
RESISTANCE SWITCHES
PRESSURE SENSITIVE
MOTOR CONTROLS
LIGHT CONTROLS

1. DUAL VOLTAGE HEATING FOR COOKING using two stamped out heating elements or 1 stamped out heating element in combination with Nichrome wire,calrod type or etched and sprayed combinations of conductors.

   Lou Radler had introduced Stanley Arron to Mitchell Liftig who later introduced the Dual Voltage Concept to President Baldridge and V.P. Helious of Scovill Mfg for purposes of negotiating a liscense agreement. Also was visited at the plant by Mr Helious to discuss this and explore costs, applications etc of Variable Resistance Pressure Sensitive Switches on which patent is pending. Negotiations ended with phone call from Helious that he would try to develop their own Variable Resistance Pressure Sensitive Switch.

   Entered into developement program with Harold Finnstrand to develope this unit jointly as evidenced by agreement of Dec 8,1964. Irving Gorbach and ~~Stanley~~ Stanley were advised of this for purposes of financing.

2. Electric SHOVEL AND SANDWICH TYPE AUTOMOTIVE Defroster and dehumidifier.Had meeting on December 4th at Mr Lou Radler's office on Black Rock Tpke in Fairfield. Mr Radler is head of the Manufacturing and product developement division of AMERICAN SAFETY EQUIPMENT CORPORATION an affiliate, or division of HICKOK products. Mr Radler was accompanied by his associate Mr Larry Knabler, of New Haven.We demonstrated our sandviched,flat patented heating elements and other elements for option,adoption, liscensing and manufacture in products for American Safety Products and his other clients and outlets. Specific items discussed were listed on a sheet in addition to the electrically heated snow shovel which we have developed. Also showed how to use various shapes of our elements to keep front and rear windows clear; of both ice and snow; and defogging.. Demonstrated how ourheating elements cover ~~in diameter~~, whereas present defroster guns cover about 1 Square inch of glass.



STANZO ELECTRONIC INDUSTRIES, INC.
P. O. BOX 2186 – BRIDGEPORT, CONN. • AREA CODE 203-374-3600

3. Battery Operated BELTS, Socks and Gloves. Concept of using our flat heating elements and our flat heating ~~zzz~~ elements in combination with Aluminum Tape and other flat etched or sprayed conductors. Also Scarfs,shoulder,back, joint,muscle warmers,face masks-Medicinal & Sports. Offered joint programs for merchandise and manufacture of belt to Mssrs. Harvey and Joe Bressler of the Bridgeport Web Co.Offor was submitted on December 7, to be accepted by December 19,1964.

4. Heated Automotive Seat Belt. Idea conceived shortly after idea of battery operated Belt, on same day. Heat is provided by Automotive electrical system or batterys.

5. EXPANDED HEATING PANALS. Made by using Aluminum or other foil off a portion of our Stamped or etched flat heating elements. Applications for warming panals,space heating and cooking.

6. Automobile and Truck Window Defrosting. Build Aluminum foils or stamped out flat,etched, or sprayed conductors into the moulding under the windows or run same along outside of moulding.

7. BATTERY OPERATED COLD WEATHER PACK. Operate Window defrosters and Engine warmer overnite or off battery when Automotive Vehicle is not running. Power could come from 1 or more batterys.

STANSO ELECTRONIC
INDUSTRIES INC.

Stanley Arron
Exec.V.P.

STANZO ELECTRONICS

LABORATORY:
ROXBURY, CONN.

COOK-RAY STOVES
BATTERIES
TRANSFORMERS
CABLE
AEROSOLS

VARIABLE
RESISTANCE SWITCHES
PRESSURE SENSITIVE
MOTOR CONTROLS
LIGHT CONTROLS

DeM PX-29 DeM PX-110

A G R E E M E N T

THIS AGREEMENT made and entered into this day of , 1965, by and between Raphael Costanzo residing at 119 Part Street, Bridgeport, Connecticut; Stanley Aaron residing at 10 Seymour Street, Bridgeport, Connecticut; Henry DeMarco residing at , Shelton, Connecticut; Joe DeMarco residing at , Shelton, Connecticut; and Alex DeMarco residing at , Shelton, Connecticut.

WHEREAS, said Costanzo is possessed of certain valuable information relating to various types of body warming devices and to their manufacture and use, and

WHEREAS, said Costanzo has made certain inventions pertaining to low voltage, battery operated heated socks and in other low voltage battery operated body warmer devices, hereinafter referred to as "heated socks" and "other body warming devices" respectively on which application for United States Letters Patents will be filed; and who in the future expects to come into possession of additional information pertaining to said "heated socks" and "other body warming devices"; and

WHEREAS, Stanley Aaron has marketing experience in developing a market for said "heated socks"; and

WHEREAS, Henry DeMarco, Joe DeMarco, and Alex DeMarco respectively (hereinafter referred to as DeMarco's) have available to them the manufacturing resources and finances to commence the manufacture and production of said "heated socks".

NOW, THEREFORE, in consideration of the promises herein made, it is mutually agreed as follows:

PLAINTIFF'S EXHIBIT B-Dist 11864

1. That the parties hereto immediately form a corporation, (hereinafter referred to as the "New Company")

2. That the "New Company" shall be formed and incorporated pursuant to the laws of the State of Connecticut,

3. That the name of the "New Company" shall be decided upon by a majority vote of the parties hereto, and that in the event the desired name is not available, then the "New Company" shall be named by whatever name is available as the parties hereto by majority vote may select,

4. The specific purpose for which the "New Company" is to be organized is to market and sell said "heated socks",

The general purposes of the "New Company" are to engage in any business in which a duly organized corporation under the laws of the State of Connecticut may legally engage, accept any business that is required to be specifically set forth in its Certificate of Incorporation and is not specifically enumerated herein, and set forth therein.

5. The Certificate of Incorporation of the "New Company" shall provide the following:

(a) That the duration of the "New Company" shall be perpetual.

(b) That the principle office of the "New Company" shall be located at , Connecticut.

(c) That the number of directors of the "New Company" shall be six (6).

(d) That the authorized capital stock of the "New Company" shall be one-thousand (1,000) shares of common stock, each having a par value of one dollar ($1.00) per share.

(e) The "New Company" shall commence business with a working capital of one thousand dollars ($1,000.00).

(f) The officers of the "New Company" shall be as follows:

Henry DeMarco	- President
Raphael Costanzo	- Vice President
Joe DeMarco	- Treasurer
Stanley Aaron	- Secretary and Merchandising Manager
Alex DeMarco	- Assistant Treasurer
Arthur T. Fattibene	- Assistant Secretary

(g) Each of the above named officers shall also be a director of the "New Company".

6. That the parties hereto will enter into an agreement with Arthur T. Fattibene whereby they will agree to hold said Arthur T. Fattibene harmless from any actions of the "New Company",

7. Immediately upon the organization of the "New Company", Raphael Costanzo shall subscribe to two-hundred and fifty (250) shares of common stock and shall pay therefor the sum of two-hundred and fifty dollars ($250.00) in cash within seven days after date of incorporation;

Stanley Aaron shall subscribe two-hundred and fifty (250) shares of common stock and shall pay therefor the sum

of two-hundred and fifty dollars ($250.00) in cash within seven days after the day of incorporation; and,

Henry DeMarco, Joe DeMarco, and Alex DeMarco, together shall subscribe to five-hundred (500) shares of common stock of the "New Company" to be divided equally between them, and that they shall together pay therefor the sum of five-hundred dollars ($500.00) in cash within seven days of the incorporation of the "New Company".

8. Upon the incorporation of the "New Company", Raphael Costanzo shall grant to the "New Company" a license to manufacture, have manufactured, and sell said "heated socks" embodying his inventions and ideas upon the terms and conditions set forth in the suggested license attached hereto as Exhibit A,

9. That the DeMarco's agree that their wholly owned Shelton Hosiery Company of Shelton, Connecticut, shall manufacture said "heated socks" exclusively for the "New Company" and that the DeMarco's agree that the Shelton Hosiery Company will sell "heated socks" to said "New Company" at cost,

10. That as to any new developments or products which Raphael Costanzo may make pertaining to said "other body warming devices" and specifically excluding therefrom his present concepts, inventions, and developments pertaining to a low voltage, battery operated, heated belt, it is agreed among the parties hereto that the DeMarco's Shelton Hosiery Company shall have the first option as to whether or not it desires to undertake the exclusive manufacture and production of such "other body warming

devices" for said "New Company"; in the event said "New Company" acquires any license or rights therefor from Raphael Costanzo:

(a) That the Shelton Hosiery Company must be exercise its option of paragraph 10 within ninety days (90) from the date that the "New Company" acquires any license or rights in and to any invention or development which pertain to said "other body warming devices". In the event that the Shelton Hosiery Company does not desire to exclusively manufacture said "other body warming devices" for said "New Company", upon the expiration of said ninety days (90) option, then the "New Company" shall then be free to affect its own manufacture if it so desires of such "other body warming device" licensed thereto, or to have the same manufactured for it by others. If Shelton Hosiery Company does exercise said option to manufacture said "other body warming device", it shall do so on the same terms and conditions pertaining to said "heated socks".

11. That the "New Company" shall not acquire any rights of any kind in and to any invention conceived or developed by Raphael Costanzo without the express written consent of Raphael Costanzo,

12. It is further agreed between the parties that the "New Company" shall not acquire any shop right in or to any invention conceived, made or developed by Raphael Costanzo while in the employee of the "New Company",

13. It is further agreed that Raphael Costanzo shall pay for all of the costs and expenditures incurred in developing and patenting his inventions pertaining to said "heated

socks" and said "other body warming devices", which costs and expenditures shall be reimbursed to Costanzo in the event that the "New Company" acquires a license or right in and to any of said inventions.

14. Raphael Costanzo further agrees that upon the incorporation of the "New Company" and as the DeMarco's shall request that he shall supply to the "New Company" all of the specifications, working and other drawings, and any other information which he may possess that may be reasonably necessary to enable the DeMarco's to manufacture in their Shelton Hosiery Company plant the "heated socks" licensed to the "New Company",

15. That the rights or licenses granted to the "New Company" by Raphael Costanzo in and to his inventions shall not be assigned or sub-licensed by the "New Company" without the written consent of Raphael Costanzo,

16. That Raphael Costanzo and Stanley Aaron agree to execute a license between Stanzo Electronics and the "New Company" granting to the "New Company" a licensed right to use in its products the heating element of U. S. Patent 2,844,698 if the "New Company" so desires,

17. In return for Raphael Costanzo and Stanley Aaron making the above agreements, the DeMarco's agree to pay to Raphael Costanzo and Stanley Aaron the sum of Eleven Thousand Dollars ($11,000.00) to be divided equally between them, and which payment is to be made as follows: Twenty-Seven Hundred and Fifty Dollars ($2,750.00) payable to each Costanzo and Aaron, individually, upon signing of this agreement, and a second payment

of twenty-seven hundred and fifty dollars ($2,750.00) to be paid to each Costanzo and Aaron within ninety (90) days after the signing of this agreement.

18. In the event that Raphael Costanzo is voted out as an officer and/or director of the "New Company", then the "New Company" shall be obliged to pay Raphael Costanzo a royalty of five percent (5%) based on the gross sales of the "New Company" or Ten Thousand Dollars ($10,000.00) per year, whichever sum is greater for a term of seventeen (17) years or for the term of the license agreements under which the "New Company" shall be licensed by Raphael Costanzo, whichever term is greater,

19. The DeMarco's agree that they shall make available to the "New Company" at least Twenty Thousand Dollars ($20,000.00) as may be required from time-to-time in order to immediately commence the manufacture and sale of said "heated socks",

20. The "New Company" shall reimburse out of profits, to any of the parties hereto, who has expended his own funds for machinery or equipment, legal fees, traveling, selling or advertising expenses or any other expense personally incurred exclusively for the benefit of the "New Company". The reimbursement of the personal expenses incurred exclusively for the benefit of the "New Company" by the respective parties hereto shall be made in the manner and form as directed by the Board of Directoss, and that upon the reimbursements of all such expenses, the equipment, material, and/or services so reimbursed shall become the exclusive property of the "New Company".

21. That in the event of dissolution, insolvency, bankruptcy, forced assignment, or the ceasation of business of the "New Company" for any reason, all patents, licenses, and/or rights granted by Raphael Costanzo to the "New Company" shall immediately and automatically revert to said Raphael Costanzo, and the license granted to the "New Company" by Stanzo Electronics shall immediately and automatically revert to Stanzo Electronics,

22. It is further understood and agreed that in the event the "New Company" does not show a profit sufficient to pay Raphael Costanzo a salary commensurate with that of the other officers of the "New Company" or a return on dividends of at least ten-thousand dollars ($10,000.00) per year by the end of the fifth year of the "New Company's" operation, then Raphael Costanzo shall have the right to resign from the "New Company" in which event the "New Company" shall then become obligated to Costanzo in the same manner as though he were voted out of the "New Company" in accordance with paragraph 18,

23. In the event of dissolution or the ceasation of business of the "New Company" for any reason, its assets, except the patented or licensed rights granted to it by Raphael Costanzo, which shall revert automatically to him and the patented rights licensed by Stanzo Electronics which automatically revert to the latter are to be first used to pay the creditors of the "New Company" and thereafter to reimburse the DeMarco's for whatever loans they may have made to the "New Company" in commencing the business of the "New Company", and any assets remaining thereafter shall be divided among the respective share holders

of the "New Company" on a pro-rata basis in accordance with their respective share holdings.

24. The parties hereto authorize the designees of Arthur T. Fattibene, Esq. to accomplish the formal statutory requirements of incorporation of the "New Company",

25. This agreement shall not be assignable in whole or in part except upon written consent of all the parties hereto,

26. This agreement shall be construed in accordance with the laws of the State of Connecticut,

27. This agreement shall terminate upon the occurence of any of the following events:

(a) Failure of the "New Company" to ratify the same upon its incorporation.

(b) Ceasation of the "New Company's) business.

(c) Bankruptcy, receivership or dissolution of the "New Company".

(d) The voluntary agreement of all the parties who are bound by the terms hereto.

28. This agreement shall be binding upon the parties hereto, their legal representatives, successors and assigns, and upon its ratification, by the "New Company" upon all subsequent stock holders thereon.

In witness whereof the parties have signed and sealed this agreement on the date first above mentioned.

Witness	Raphael Costanzo
Witness	Stanley Aaron
Witness	Henry DeMarco
Witne	Joe DeMarco
Witness	Alex DeMarco

PX-110

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121C

PX
121C

Seneca Knitting Mills Co., Inc.

Red Jacket HOSIERY Red Top SPORTSMEN'S SOCKS

Seneca Falls, N.Y. 13148

TELEPHONE 315-568-9441

FRANCIS J. SOUHAN
PRESIDENT
GEORGE G. SOUHAN
EXECUTIVE VICE PRESIDENT

NEW YORK OFFICE
450 7TH AVE
LA 4-9026

December 28, 1965

Advertising Associates, Inc.
403 Noble Ave.
Bridgeport, Conn.

Att: Mr. J. Brett, Jr.

Dear Mr. Brett:

Thank you very much for your letter of Dec. 22nd. We are pleased to enclose a circular on our Electric Thermal Sock. This sock wholesales for $3.98 pair. It is designed to retail for approximately $8.00 pair.

If I can furnish you with any additional information, do not hesitate to contact me.

Yours truly,

SENECA KNITTING MILLS CO., INC.

William T. Hughes
Vice President - Sales

/ds
enc.

107-

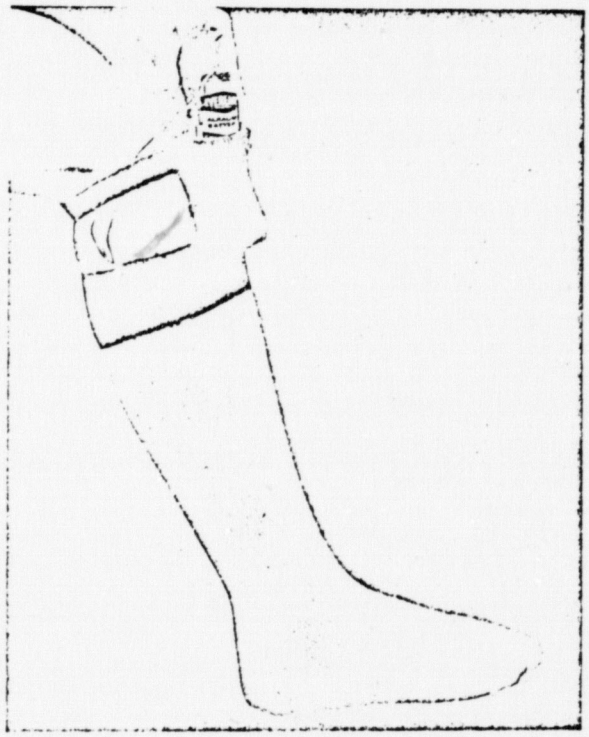
DX-G52 S2

visa-therm electric socks

PK52

by SENECA

millions of people still suffer and complain about cold feet . . . .
thermal construction and synthetics alone were not enough. SENECA makes sock history with a battery heated sock for the mass markets.



Patents Pending

BATTERIES

Use any "D" Cell Battery. Rechargeables or throw aways. Eveready #95 is recommended as spectacular. They are low cost and will provide satisfactory heat for over 5 hours without recharging.

SOCK CONSTRUCTION

15" high over the calf. 85% Wool, 15% Stretch Nylon. Washable. Full Terry Knit inside. No wires under foot. Battery snaps onto top of socks.

Sizes — Regular 10 to 11½
Large 12 and 13

COMFORT

Socks are worn as any other sock. Battery Pack and Connectors snap on and off to add heat when needed. There is never any inconvenience or discomfort.

TOTAL MARKET — 35,000,000 PEOPLE

ACTIVE SPORTSMEN	SEDENTARY SPECTATORS	OCCUPATIONAL USERS	PHYSICAL PROBLEMS
• Hunters	• Football Games	• Police	• Cold Extremities
• Golfers	• Hockey Games	• Letter Carriers	• Poor Circulation
• Campers	• Ski Events	• Guards	• Heart Condition
• Skiers		• Outdoor Workers	• Chilblains
• Skaters		• Armed Forces	• Ageing

SENECA KNITTING MILLS CO., INC.

Ex 169, 167

Form No. 81-7 (a)

4-PX-169

$25.00 FORFEITURE
Each corporation failing to file its first annual report within 30 days after its organization meeting shall forfeit to the state $25.00. (Sec. 33-299, Conn. G.S.)

ORGANIZATION AND FIRST ANNUAL REPORT

(Domestic Stock Corporation)

1. Name of corporation STANZO ELECTRONIC INDUSTRIES, INC.

2. Date of organization meeting October 29, 1963

3. Report date October 29, 19 63
(A date not later than the filing date and not earlier than the date of any change of circumstances affecting the statements in this report.)

4. Principal Office 119 Park Street, Bridgeport, Connecticut
(Principal office in Connecticut.)

5. Directors and officers:

Name	Title	Business Address	Residence Address
Raphael Costanzo	Pres.	119 Park St., Bpt. Conn.	119 Park St., Bpt., Conn.
Gloria Pachora	Vice-Pres.	171 Golden Hill St., Bpt., Conn.	234 Savoy St., Bpt., Conn.
Patricia Sulzycki	Secty.-Treas.	171 Golden Hill St., Bpt., Conn.	349 Noble Ave., Bpt., Conn.

6. Aggregate issued shares:

Class	Series	Par	Number Issued & Outstanding	Number in Treasury	Amount Payable on Shares If Not Fully Paid
common		$1.00	2,000	none	none

7. Under the penalties of perjury, I declare that the statements made in this report are true.

Signed at Bridgeport, Conn. this 29th day of October, 1963

Signature of President or vice President or Secretary or Asst. Secretary or Treasurer or Asst. Treasurer Raphael Costanzo

NOTE:

Under the provisions of the General Statutes, all corporations are required to file the organization and first annual report within 30 days after the organization meeting. Subsequent annual reports shall be filed between the first day of January and the first day of March of each calendar year up to and including the calendar year in which the corporation is dissolved. (Sec. 33-298, Conn. G.S.)

(This report must be filed in duplicate.)

Filing Fee $16.00

PX-169A

PX-169A

STATE OF CONNECTICUT

ANNUAL REPORT–DOMESTIC CORPORATION

Due on or before March 1st with THE SECRETARY OF THE STATE, HARTFORD 15, CONN

FILING FEE $[illegible]
CHECK OR MONEY ORDER PAYABLE TO THE SECY OF THE STATE

STATEMENT OF STOCK DISTRIBUTION	NUMBER	CLASS	SERIES	PAR VALUE
Total shares issued	[illegible]	[illegible]		[illegible]
Shares outstanding	[illegible]	[illegible]		[illegible]
Corporate treasury shares				
Shares issued since last annual report				

5. ARE THESE SHARES FULLY PAID? [X] YES [ ] NO

6. IF NOT, ENTER AMOUNT UNPAID. $

SPECIAL INSTRUCTIONS FOR LATE FILING. A penalty payment of $25 (in addition to the filing fee) must, by law, accompany each Annual Report filed after March 1st. The penalty payment must be made by separate check or money order payable to the ATTORNEY GENERAL. Both parts must be returned with this Annual Report.

DO NOT COMBINE THE TWO PAYMENTS IN ONE CHECK

ORIGINAL

Fill out all three cards. Keep card marked YOUR COPY. Return other two in envelope provided.

DO NOT FOLD, BEND, TEAR, OR PERFORATE THIS CARD.

POINT NUMBER | INCORP. | TOWN | SIZE

▼ MAILING ADDRESS (If incorrect, show changes here) ▼

STANZO ELECTRONIC INDUSTRIES INC
RAPHAEL COSTANZO
119 PARK ST [illegible]
BRIDGEPORT CONN

ACCOUNT NO. ▼ 750865

1964 — A REPORT YEAR | 015 — TOWN & CODE | 11/63 — DATE OF INCORPORATION

▼ ADDRESS OF PRINCIPAL OFFICE IF DIFFERENT FROM MAIL ADDRESS ▼
(Do not use this section for correcting mail address. See above.)

[illegible]
[illegible]

BE SURE TO COMPLETE REVERSE SIDE

▼ OFFICER'S CERTIFICATION ▼

I certify, under the penalties of perjury, that the statements made in this report are true and complete as of date of report.

DATE OF THIS REPORT [illegible] | TITLE OF OFFICER [illegible]

SIGNATURE [illegible]

ONE SIGNATURE: PRESIDENT, VICE PRES. DIRS, SECY, ASST SECY, TREASURER, ASST TREASURER, EXECUTIVE OR TRUSTEE

OFFICERS OF CORPORATION (AS OF DATE OF THIS REPORT)

	NAME	BUSINESS ADDRESS	RESIDENCE ADDRESS	ALSO DIR. (X)
PRES.	[illegible]	[illegible]	[illegible]	
V. PRES.	[illegible]	[illegible]	[illegible]	
V. PRES.	[illegible]	[illegible]	[illegible]	
TREAS.	[illegible]	[illegible]	[illegible]	
ASST. TREAS.				
SEC.				
ASST. SECY.				

OTHER DIRECTORS OF CORPORATION (IF NOT CHECKED ABOVE)

If [illegible] space is not sufficient, [illegible]

U.S.404-0 PSC

110

PX - 169B

VOL 713 1501

OFFICE OF THE SECRETARY OF THE STATE
HARTFORD, CONNECTICUT 06115

CERTIFICATE OF DISSOLUTION
BY FORFEITURE

FORM NO. 61-31 A

DATE OF THIS NOTICE

STANZO ELECTRONIC INDUSTRIES INC
RAPHAEL COSTANZO
P O BOX 2186
BRIDGEPORT CONN

SEPT. 28 1966

750865

I hereby certify that as of the date of this notice the above named corporation has been dissolved by forfeiture as required by the General Statutes, because of its failure to file annual reports.

Secretary of the State

8X-296

COPY

LICENSE AGREEMENT

between

BENJAMIN M. HINES
(Investor)

and

RAPHAEL J. COSTANZO
(Inventor)

Dated: December 27, 1965

Curtis Buckley & Hilgendorff
ATTORNEYS AND COUNSELORS AT LAW
PEOPLE'S SAVINGS BANK BUILDING
885 MAIN STREET
BRIDGEPORT, CONNECTICUT 06603

THIS AGREEMENT made this 27th day of December, 1965, between BENJAMIN M. HINES of Fairfield, Connecticut (hereinafter called the "Investor"), and RAPHAEL J. COSTANZO of Bridgeport, Connecticut (hereinafter called the "Inventor"),

W I T N E S S E S:

WHEREAS, the Inventor has invented a new and useful device known as battery-powered socks (hereinafter called the "Invention") and has applied for United States letters patent on the Invention, which application was filed on September 13, 1965, under Serial Number 478011; and warrants that he is the sole owner of all rights under the Invention and has the right to grant the exclusive license hereinafter granted, and that the Invention, its improvements and the writings relating thereto have been revealed to no one except his patent attorney and others whom the Investor attempted to interest prior to the execution of this Agreement, some of whom are known to the Investor; and

WHEREAS, the Investor wishes to obtain the sole and exclusive right and license to manufacture, use and sell, and license others to manufacture, use and sell, the Invention and other foot-warming devices embodying its heating elements, all as disclosed, covered or claimed in such patent application and any and all patents which may be granted thereunder;

NOW, THEREFORE, in consideration of the foregoing recitals and the mutual covenants and agreements hereinafter made, the parties agree as follows:

1. License; Right of First Refusal. The Inventor hereby grants to the Investor upon the terms and conditions hereinafter stated the exclusive right and license under the aforesaid patent application and under any expansions, divisions, substitutions, continuations and continuations in part thereof, and under any patents that may be issued thereon or any reissues or extensions thereof, to make, use and sell, throughout the United States of America, its territories and dependencies and all foreign countries, the Invention and other foot-warming devices embodying the heating elements and principals described or claimed therein.

If at any time during the period of this Agreement, the Inventor shall adapt the elements or design of the Invention to any other body-warming product or device, he shall promptly notify the Investor of such adaptation and shall make full disclosure thereof, and the Investor shall have a period of thirty days from the date of such disclosure within which to reach an agreement with the Inventor with respect to licensing or other rights regarding such adaptation. If the parties fail to reach agreement within such thirty-day period, the Inventor shall have no further obligations to the Investor with respect thereto.

2. Feasibility Study. With the Inventor's assistance and co-operation, the Investor shall commence promptly and pursue with reasonable diligence studies to determine the technical and economical feasibility of profitable development, production and sale of battery-heated socks.

3. Royalties. Except as hereinafter provided, the Investor shall pay to the Inventor royalties on all sales of battery-heated socks or other foot-warming devices using the heating element (hereinafter called the "Licensed Products") sold hereunder of ten (10) per cent of

the net sales price thereof. The net sales price of each Licensed Product shall be the actual sales price thereof, as shown on the Investor's invoices therefor, reduced by the following: (i) all state sales and use taxes and all Federal excise taxes applicable to the sale; (ii) all trade and quantity discounts offered and taken in connection with the sale; and (iii) all freight allowances given in connection with the sale or, in lieu of any such allowances, the actual freight costs to the Investor if the sale is made on any basis other than F.O.B. at the Investor's plant of manufacture.

The sale of a Licensed Product shall be deemed to have been made on the date that the Investor's invoice therefor is mailed to the purchaser; provided, however, that, if the purchaser returns the Licensed Product after the date of such invoice, no sale of the product shall be deemed to have been made or, if a royalty has already been paid to the Inventor on the returned Licensed Product, the Investor shall be entitled to a credit for the amount of the royalty so paid against the next royalty payment becoming due hereunder.

All royalties for Licensed Products sold during a calendar quarter shall be due and payable on the last day of the second month succeeding such calendar quarter and shall be deemed to have been paid when the Investor's check for the amount of the royalties, drawn against sufficient funds, is deposited in the United States mails, first class postage prepaid, and addressed to the Inventor at the address set forth herein.

If during the calendar year 1967 or any succeeding calendar year the royalties paid to the Inventor (including those paid by any sublicensee

under Article 6 hereof) for such year are less than $5,500 then, unless the Investor on or before the last day of February of the succeeding calendar year pays to the Inventor an amount equal to the difference between such $5,500 and the amount of royalties actually paid for such calendar year, the Inventor may terminate this Agreement at any time during March of said succeeding calendar year by giving the Investor notice of termination.

If a default exists for thirty days in the payment by the Investor of any royalties owing to the Inventor hereunder, the Inventor may at any time prior to the time such default is cured terminate this Agreement by giving notice of termination to the Investor.

If the Inventor gives notice of termination pursuant to this Article 3, this Agreement and all rights and duties of the parties hereunder shall thereupon terminate except for the right of the Inventor to collect from the Investor any unpaid royalties owing with respect to sales of the Licensed Products made prior to the time of termination. If the Inventor is entitled to terminate this Agreement during any specific period and fails to exercise such right, he shall be deemed to have waived the same; but such waiver shall not operate as a waiver of any subsequently arising right of termination of the Inventor.

The Investor shall keep accurate records and books of account showing the quantities, selling prices, and dates and sales of Licensed Products, to which records and books any Certified Public Accountant designated in writing by the Inventor shall have access at all reasonable times. The Investor shall furnish to the Inventor with each royalty check

a written statement showing the quantities and selling prices of the Licensed Products sold by the Investor during the preceding calendar quarter together with a statement of all relevant adjustments thereof.

Matters such as the number of the Licensed Products to be manufactured, the sales price thereof, the time and place of manufacture, and the sales and promotional efforts to be made in connection with the sale thereof shall be in the sole control and discretion of the Investor.

4. Minimum and Advanced Royalties. The Investor shall make the following payments to the Inventor:

$500 (receipt of which is hereby acknowledged by the Inventor) on the execution and delivery of this Agreement;

$500 on April 1, 1966;

$500 on July 1, 1966;

$1500 on October 1, 1966;

$2500 on January 1, 1967; and

$1375 on each April 1, July 1, October 1 and January 1 thereafter during the period of this Agreement;

provided, however, that the royalties provided in Article 3 hereof shall be reduced by any such payments.

5. Reduction in Royalties. The schedule of royalties hereinabove set forth shall obtain until and unless (i) a court of final jurisdiction refuses the Inventor a patent on the Invention or (ii) a successful infringement suit is brought against the Investor. Following the happening of either of these events, the royalties thereafter becoming due and payable hereunder shall be reduced from ten (10) per cent to five (5) per cent and, correspondingly, the quarterly payments due hereunder shall be

reduced from $1,375 to $687.50. The Investor shall have no obligation to appeal any adverse decision, but this shall not preclude the Inventor's taking such an appeal in his discretion and at his expense and, should the adverse decision be reversed on appeal, the original royalty schedule provided herein shall be reinstated; provided, however, that the Inventor shall not receive retroactive royalties for the difference between the original and reduced scale for the period during which such adverse decision was in effect.

6. Sublicenses. The Investor shall have the right to grant sublicenses hereunder on terms not inconsistent herewith, including the quarterly payment of royalties by the sublicensee at a rate not less than that specified in Article 3 or 5 hereof, whichever may apply. The Inventor shall be furnished with a copy of each sublicense granted by the Investor. The Investor shall pay over to the Inventor that part of the royalties actually received by him from such sublicensees which corresponds to the royalty rate specified in Article 3 or 5 hereof, whichever may apply.

7. Consulting Services. In consideration of the royalty payments herein set forth, the Inventor shall work with the Investor, his engineers and manufacturers, during the initial period of development, design and production of the Invention, in order to minimize the delay and expense thereof. The Inventor's services hereunder shall include, but not be limited to, preparing specifications, consulting with respect to sources of supply and making available all information, including secret processes, reasonably necessary to design and produce the Invention as rapidly and economically as possible. The Investor shall disclose such

information only to the extent reasonably necessary to design and produce the Invention. After the Invention is in production, the Inventor will render such individual consulting services as the Investor may reasonably request from time to time. It is understood that the Inventor's services hereunder shall be part-time only; and nothing herein shall be construed as obligating the Inventor to perform services to a degree which in his sole discretion impairs unreasonably his ability to meet his other business responsibilities. The Inventor's status in performing services hereunder shall be that of an independent contractor, rather than an agent or employee, and the Inventor shall have no power to enter into any contract or other undertaking on behalf of the Investor.

8. Litigation. The Inventor will prosecute the pending Application Serial Number 478011 for the United States patent on the Invention at his expense. The Investor will at his expense prosecute any foreign application which he deems necessary or desirable in his discretion, and will undertake at his expense such litigation as he deems necessary or desirable in his discretion in furtherance of his interests hereunder in order to defend United States or any foreign patents granted for the Invention; provided, however, that the Inventor shall pay, or reimburse the Investor for payment of, fifty (50) per cent of any such expenses incurred hereafter in any such foreign application or litigation; provided, however, that the Inventor's share thereof paid or accrued in any such calendar year shall not exceed the amount by which his payments hereunder for such year exceed $5,500. The Inventor will co-operate and give evidence in any such litigation.

If any third party infringement of the licenses patent comes to the attention of either of the parties, the party having knowledge thereof shall promptly notify the other party of such infringement, whereupon the parties shall consult with a view to reaching agreement as to means of eliminating the infringement. If the Inventor wishes to litigate the infringement and the Investor refuses to do so, the Inventor may at his discretion and at his expense bring suit to restrain such infringement, may join the Investor as a party plaintiff in such suit, and shall be entitled to receive and retain for his own benefit any recovery awarded in such suit.

9. Improvements. Upon the request and at the expense of the Investor, the Inventor shall make such further patent applications in the United States or in foreign countries for the Invention or for improvements made by the Inventor as the Investor deems necessary or desirable, subject to the following:

(a) The Inventor shall submit immediately in writing to the Investor all inventions, developments and modifications made by him relating to improvements in the subject matter claimed in the patent application, together with all records, data, plans, drawings, designs and specifications. If the Investor, within thirty days after receipt thereof, does not indicate a desire to include said improvements within the terms of this Agreement, the Inventor may at any time after said thirty-day period, at his expense and in his name, make any United States or foreign applications, and all right, title and interest in any patents so obtained shall be his

property and shall be excluded from this Agreement; and

(b) If the Investor desires to include said improvements within the terms of this Agreement, the Investor shall file for a patent application thereon within sixty days after acceptance and prosecute such patent application to final conclusion at his expense, and the Inventor shall co-operate and execute the necessary documents to effect this provision. Failure to file such patent application or failure successfully to prosecute such patent application shall indicate a rejection of said improvements by the Investor whereby the Inventor shall have the option to exercise his rights thereto in accordance with paragraph 9(a) herein.

10. Patent Invalidity. If any claim of the patent application under which this license is granted shall be declared invalid by a final decision of a court of competent jurisdiction (whether an appellate court or a lower court whose decision becomes final by failure to appeal therefrom) or if, as a result of a final decision of a court of final jurisdiction, any such claim shall be hereafter awarded to another, then the royalties herein shall be reduced as provided in Article 5 of this Agreement. If a court of competent jurisdiction shall give any construction or interpretation to any such claim, such construction or interpretation shall thereafter be binding upon both parties unless such construction or interpretation shall later be changed by an appellate court or other court of competent jurisdiction, in which event the later construction or interpretation shall be binding.

11. Admission of Patent Rights. The Investor hereby admits, during the continuance of this license, the validity of the patent rights under which he is hereby licensed, and agrees that he will not, directly or indirectly, question or attack the validity of any claim thereof during the continuance of this license.

12. Marking. The Investor agrees to mark all Licensed Products sold by him hereunder with the number of any patent under which he is hereby licensed that is applicable thereto, or with patent applied for if an application therefor is pending.

13. Termination. If the Investor shall violate or fail to keep or perform any obligation, term or condition hereof, or if the Investor shall be adjudged a bankrupt or become insolvent or make an assignment for the benefit of creditors, or (if the Investor is succeeded by a corporation as hereinafter provided) become insolvent or be placed in the hands of a receiver or trustee in bankruptcy, then, upon the happening of any one or more of such events, the Inventor may, at his option, terminate this Agreement by giving the Investor sixty (60) days' written notice, specifying the default complained of; provided, however, that, if the Investor shall within such sixty (60) days cure the default complained of, then such notice shall cease to be operative and this Agreement shall continue in full force and effect as though such default had not occurred.

In the event of termination hereunder or under Article 3 hereof, the Investor shall return promptly to the Inventor all documents submitted by him respecting the Invention and shall re-assign to the Inventor all rights granted hereunder; and thereafter neither party shall have any further rights or obligations hereunder.

The termination of this Agreement for any reason whatsoever shall not release the Investor from his obligation to pay royalties owing to the Inventor up to the date of such termination; provided, however, that the Investor may terminate this Agreement at any time during 1966 without obligation save for the fixed royalty payment or payments which shall have become due and payable prior to such termination, with no pro-ration to reflect accrual on unmatured payments.

14. Arbitration. Any dispute arising hereunder shall be settled by arbitration in Bridgeport, Connecticut, under the rules and practices then obtaining of the American Arbitration Association; and the prevailing party in any such arbitration proceedings may obtain judgment thereon in any court of competent jurisdiction.

15. Notices. Notices hereunder shall be deemed duly given if addressed to the Investor at

546 Old Academy Road
Fairfield, Connecticut

and to the Inventor at

119 Park Street
Bridgeport, Connecticut.

16. New Corporation. The Investor expects to form a new Connecticut corporation to assume his rights and obligations hereunder. The Investor shall have the right to assign to such corporation all his rights hereunder, subject to performing his obligations hereunder, in the event of which assignment the Investor personally shall have no further liabilities or rights hereunder.

18. Succession. This Agreement shall inure to the benefit of and shall be binding upon the heirs, representatives and assigns of the parties hereto.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in duplicate as of December 27, 1965.

Benjamin M. Hines (L.S.)
Benjamin M. Hines

Raphael J. Costanzo (L.S.)
Raphael J. Costanzo

STATE OF CONNECTICUT,)
) ss.:
COUNTY OF FAIRFIELD,)

On December 27, 1965, before me, W. Bradley Morehouse, the undersigned officer, personally appeared BENJAMIN M. HINES, known to me to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand.

Commissioner of Superior Court
Fairfield County, Connecticut

STATE OF CONNECTICUT)
) ss.:
COUNTY OF FAIRFIELD,)

On December 27, 1965, before me, W. Bradley Morehouse, the undersigned officer, personally appeared RAPHAEL J. COSTANZO, known to me to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand.

Commissioner of Superior Court
Fairfield County, Connecticut

Ex 23c4
Dx W/1

LICENSE AGREEMENT
(Appendix to December 27, 1965 Agreement)

RAPHAEL J. COSTANZO
Licensor-Inventor

and

TIMELY PRODUCTS CORPORATION
Licensee

March 7, 1969

APPENDIX TO DECEMBER 27, 1965 AGREEMENT

WHEREAS, Benjamin Hines of Fairfield, Connecticut and Raphael J. Costanzo of Bridgeport, Connecticut (hereinafter called the "Inventor") having entered into a written license agreement dated December 27, 1965 based on the U.S. patent application, Serial No. 478,011, filed September 13, 1965 for an Electric Heated Sock, subsequently issued as U.S. Letters Patent No. 3,293,405 on December 20, 1966;

WHEREAS, Benjamin Hines has on or about January 24, 1966 assigned all rights, title and interest in said license to Timely Products, Inc., a corporation of Connecticut which will heretoforth be called Timely;

WHEREAS, Timely has warranted that the Royalties payable pursuant to paragraph 3 of said license agreement are burdensome to a point that Timely is unable to make a fair and reasonable profit;

WHEREAS, the electric heated sock made and sold by Timely is charged to infringe the Arron patent 3,302,264; and

WHEREAS, the parties hereto are desirous of revising the license agreement.

NOW, THEREFORE, in consideration of the foregoing recitals and mutual agreements hereinafter made, the Agreement of December 27, 1965 is hereby modified and hereafter shall be as follows:

(1) As to Article 1 (License), the Inventor hereby grants to Timely upon the terms and conditions hereinafter stated the exclusive right and license under said patent 3,293,405 and any reissues thereof, and under any and all corresponding foreign patents, to make, use and sell throughout the United States of America, its territories and dependencies and all foreign countries the invention described or claimed in said patents.

(2) (Feasibility study) Article 2 is cancelled inasmuch as Timely has been for some time in commercial production of an electric heated sock.

(3) As to Article 3 (Royalties), except as hereafter provided Timely commencing on January 1, 1968 and ending on December 31, 1968 shall pay the Inventor royalties on all sal of said Licensed battery-heated socks or other foot-warming devices (hereinafter called the "Licensed Products") sold hereunder of 5-3/4 per cent of the net sales price thereof. For the year beginning January 1, 1969 and for each succeeding calendar year thereafter for the term of this agreement, Timely shall pay the Inventor royalties on all sales of battery-heated socks or other foot-warming devices within the scope of the patent, referred to as the "Licensed Products", sold hereunder of 5 percent of the net sales price thereof.

The net sales price of each Licensed Product shall be the actual sales price thereof, as shown on Timely's invoices therefor, reduced by the following (i) all state sales and use taxes and all Federal excise taxes applicable to the sales; (ii) all trade and quantity discounts offered and taken in connection with the sales; and (iii) all freight allowances given in connection with the sales or, in lieu of any such allowances, the actual freight costs to Timely if the sales are made on any basis other than F.O.B. at Timely's plant of manufacture. The sale of a Licensed Product shall be deemed to have been made on the date that Timely receives payment therefor from the purchaser; provided however, that if the purchaser returns the Licensed Product after the date of such payment, no sale of the product shall be deemed to have been made or, if a royalty has been paid to the Inventor on the returned Licensed Product, Timely shall be entitled to a credit for the amount of the royalty so paid against the next royalty payment becoming due hereunder.

Commencing with the year beginning January 1, 1969 and for each calendar year thereafter for the term of this agreement all royalties for Licensed Products sold during each calendar month of each year shall be due and payable on the fifteenth (15th) of the next succeeding month; and shall be deemed to have been paid when Timely's check for the amount of royalties, drawn against sufficient funds, is deposited in the

United States mails, first class, postage prepaid, and addressed to the Inventor at the address set forth herein.

If during the calendar year 1969 or any succeeding calendar year the royalties paid to the Inventor (including those paid by any sublicensee under Article 6 as modified hereof) for such year are less than $8,400, then, unless Timely on or before the fifteenth (15th) day of January of the succeeding calendar year pays the Inventor an amount equal to the difference between such $8,400 and the amount of royalties actually paid for such calendar year, the Inventor may terminate this Agreement at any time during February of said succeeding calendar year by giving Timely notice of termination.

If a default exists in the payment by Timely of any royalties owing to the Inventor hereunder, the Inventor may terminate this Agreement by giving thirty (30) days' written notice of termination to Timely; provided however, that such notice shall not be effective if Timely pays said royalties within such thirty days.

If the Inventor gives written notice of termination pursuant to this Article, thirty (30) days have elapsed since such notice and Timely has not cured the default, this Agreement

and all rights and duties of the parties hereunder shall terminate except for the right of the Inventor to collect from Timely any unpaid royalties owing with respect to sales of the Licensed Products made prior to the time of termination. If the Inventor is entitled to terminate this Agreement during any specific period and fails to exercise such right, he shall be deemed to have waived the same; but such waiver shall not operate as a waiver of any subsequently arising right of termination of the Inventor.

Timely shall keep accurate records and books of account showing the quantities, selling prices, and dates and sales of Licensed Products, to which records and books any Certified Public Accountant designated in writing by the Inventor shall have access at all reasonable times. Timely shall furnish to the Inventor with each royalty check a written statement showing the quantities and selling prices of the Licnesed Products sold by Timely during the preceding calendar quarter together with a statement of all relevant adjustments thereof. Matters such as the number of the Licensed Products to be manufactured, the sales price thereof, the time and place of manufacture, and the sales and promotional efforts to be made in connection with the sales thereof shall be in the sole control and discretion of Timely.

(4) As to Article 4 (Minimum and Advance Royalties) beginning January 1, 1969 and continuing until termination of this agreement Timely shall make the following minimum payments to the Inventor:

$700.00 per month to be paid each month for the term of this agreement, said minimum payment to be made on the fifteenth (15th) day of each month; provided however, that the royalties provided in Article 3 as modified by the Appendix shall be reduced by any such payments.

(5) As to Article 5 (Reduction in Royalties) the schedule of royalties hereinabove set forth shall obtain until and unless a successful infringement suit is brought against Timely. Following the happening of this event, the monthly minimum payments due hereunder shall be reduced from $700.00 per month to $350.00 per month. Timely shall have no obligation to appeal any adverse decision, but this shall not preclude the Inventor's taking such an appeal in his discretion and at his expense and, should the adverse decision be reversed on appeal, the original royalty schedule provided in this Appendix shall be reinstated, provided however, that the Inventor shall not receive retroactive royalties for the difference between the original and reduced scale for the period during which such adverse decision was in effect.

The parties hereto agree to review the equitability and ecomonics of the running royalty rate of 5 per cent in the event of an infringement liability being found by a court after a trial on the basis of the Arron patent 3,392,264 in the event no agreement can be reached to arbitrate the issues.

(6) As to Article 6 (Sublicenses) Timely has the right to grant to sublicensees hereunder on terms not inconsistent herewith, including the monthly payments of royalties by such sublicensee at a rate not less than that specified in Article 3 or 5 (as modified herein) whichever may apply. The Inventor shall be furnished with a copy of each sublicense granted by Timely. Timely shall pay over to the Inventor that part of the royalties actually received by him for each such sublicense which corresponds to the royalty rate specified in Article 3 or 5 (as modified herein) whichever may apply.

(7) As to Article 7 (Consulting Services) it is canceled inasmuch as the licensed patent has issued and the electric heated sock is in commercial production.

(8) As to Article 8 (Litigation) Timely will at its expense prosecute any foreign application which it deems necessary or desirable in its discretion, and will undertake at its expense such litigation as it deems necessary or desirable in its discretion in furtherance of its interests hereunder in order to defend United States or any foreign patents granted for the

Invention; provided however, that the Inventor shall pay, or reimburse Timely for payment of, fifty (50) per cent of any such expenses incurred hereafter in any such foreign application or litigation; provided however, that the Inventor's share thereof paid or accrued in any such calendar year shall not exceed the amount by which his payments received hereunder for such year exceed $8,400. The Inventor will co-operate and give evidence in any such litigation.

If any third party infringement of the licensed patent comes to the attention of either of the parties, the party having knowledge thereof shall promptly notify the other party of such infringement, whereupon the parties shall consult with a view to reaching agreement as to means of eliminating the infringement. If the Inventor wishes to litigate the infringement and Timely refuses to do so, the Inventor may at his discretion and at his expense bring suit to restrain such infringement, may join Timely as a party plaintiff in such suit, and in such event shall be entitled to receive and retain for his own benefit any recovery awarded in such suit.

(9) As to Article 9 (Improvements) upon the request and at the expense of Timely, the Inventor shall make such further patent applications in the United States or in foreign countries for the Invention or for improvements made by the Inventor as Timely deems necessary or desirable, subject to the following:

(a) The Inventor shall submit immediately in writing to Timely all inventions, developments and modifications made by him relating to improvements in the subject matter claimed in the patent application, together with all records, data, plans, drawings, designs and specifications. If Timely within thirty days after receipt thereof, does not indicate a desire to include said improvements within the terms of this Agreement, the Inventor may at any time after said thirty-day period, at his expense and in his name, make any United States or foreign applications, and all right, title and interest in any patents so obtained shall be his property and shall be excluded from this Agreement; and

(b) If Timely desires to include said improvements within the terms of this Agreement, Timely shall file for a patent application thereon within sixty days after acceptance and prosecute such patent application to final conclusion at his expense, and the Inventor shall co-operate and execute the necessary documents to effect this provision. Failure to file such patent application or failure successfully to prosecute such patent application shall indicate a rejection of said improvements by Timely whereby the Inventor shall have the option to exercise his rights thereto in accordance with paragraph 9(a) herein.

(10) As to Article 10 (Patent Invalidity) if any claim of the patent under which this license is granted shall be declared invalid by a final decision of a court of competent jurisdiction (whether an appellate court or a lower court whose decision becomes final by failure to appeal therefrom) or if, as a result of a final decision of a court of final jurisdiction, any such claim shall be hereafter awarded to another, then the royalties herein shall be reduced as provided in Article 5 [illegible] (modified) of this Agreement. If a court of competent jurisdiction shall give any construction or interpretation to any such claim, such construction or interpretation shall thereafter be binding upon both parties unless such construction or interpretation shall later be changed by an appellate court or other court of competent jurisdiction, in which event the later construction or interpretation shall be binding. [illegible] thirty (30) days after the default [illegible]

(11) As to Article 11 (Admission of Patent Rights) Timely hereby admits, during the continuance of this license, the validity of the patent rights under which it is hereby licensed, and agrees that it will not, directly or indirectly, question or attack the validity of any claim thereof during the continuance of this license. [illegible] Upon the termination and shall terminate all rights granted hereunder; and thereafter neither party shall have any further rights or obligations hereunder.

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(12) As to Article 12 (Marking) Timely agrees to mark all Licensed Products sold by it hereunder with the number of any patent under which it is hereby licensed that is applicable thereto, or with patent applied for if an application therefor is pending.

(13) As to Article 13 (Termination) if Timely shall violate or fail to keep or perform any obligation, term or condition hereof, or if Timely shall be adjudged a bankrupt or become insolvent or make an assignment for the benefit of creditors, or be placed in the hands of a receiver or trustee in bankruptcy, then, upon the happening of any one or more of such events, the Inventor may, at his option, terminate this Agreement by giving Timely sixty (60) days' written notice, specifying the default complained of; provided however, that, if Timely shall within such sixty (60) days cure the default complained of, then such notice shall cease to be operative and this Agreement shall continue in full force and effect as though such default had not occurred.

In the event of termination hereunder or under Article 3 hereof, Timely shall return promptly to the Inventor all documents submitted by him respecting the Invention and shall re-assign to the Inventor all rights granted hereunder; and thereafter neither party shall have any further rights or obligations hereunder.

The termination of this Agreement for any reason whatsoever shall not release Timely from its obligation to pay royalties owing to the Inventor up to the date of such termination.

(14) As to Article 14 (Arbitration) any dispute arising hereunder shall be settled by arbitration in Bridgeport, Connecticut, under the rules and practices then obtaining of the American Arbitration Association; and the prevailing party in any such arbitration proceedings may obtain judgment thereon in any court of competent jurisdiction.

(15) As to Article 16 (Notices) notices hereunder shall be deemed duly given if addressed to Timely at

Timely Products Corporation
210 Eliot Street
Fairfield, Connecticut 06430

and to the Inventor at

Raphael J. Costanzo
119 Park Street
Bridgeport, Connecticut

(16) As to Article 16 inasmuch as the corporation contemplated has been formed and assignment made thereto this Article is canceled.

(17) As to Article 18 (Succession) this agreement shall inure to the benefit of and shall be binding upon the heirs, representatives and assigns of the parties hereto.

(18) It is further agreed that upon the execution of this Appendix, Timely shall pay to the Inventor the accrued royalties in full for the year beginning January 1, 1968 and ending December 31, 1968 computed at a rate of 5-3/4 per cent of net sales, as provided in Article 3 as modified; provided however, that said accrued royalties for the year 1968 shall be reduced by the minimum royalties of $5,500 paid to the Inventor during the year 1968 and less the Inventor's fifty (50) per cent share of legal expenses incurred as per Article 8 prior to the amendment thereof.

(19) Timely further agrees that it shall not withhold payment of any patent royalties from the Inventor accruing hereunder as provided in Articles 3, 5 and 6 for any reason during the term of this License Agreement, and it being further mutually agreed and understood that in the event said royalties, as provided, are withheld from the Inventor for any reason, then the Inventor may, by giving thirty (30) days' written notice to Timely, cause the terms and conditions as modified by this Appendix to be voided ab initio upon the expiration of such period; provided however, that such notice shall not be effective

if Timely pays the withhold royalties within such period of time. If this Appendix agreement is voided, the Agreement between the parties hereto immediately shall revert to the terms and conditions as expressly set forth in the original agreement of December 27, 1965 by which the rights of remedy and obligations of the respective parties shall thereafter be governed.

(20) It is agreed between the parties hereto that the Agreement of December 27, 1965 as modified by this Appendix, constitutes the entire agreement between the parties with respect to this subject matter and supersedes and voids any other written or oral agreement between the parties with respect to the subject matter thereof.

TIMELY PRODUCTS, INC.

By: Benjamin M. Hines
President

Secretary

Dated: March 6, 1969

STATE OF CONNECTICUT)
: ss.:
COUNTY OF FAIRFIELD)

On March 6, 1969, before me, Eileen Armstrong, the undersigned officer, personally appeared BENJAMIN M. HINES, known to me to be the president of Timely Products, Inc. and

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whose name is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand.

Helen Costanzo
Notary Public

(L.S.)
Raphael J. Costanzo

Dated: _____, 1969
Bridgeport, Connecticut

STATE OF CONNECTICUT)
: ss.:
COUNTY OF FAIRFIELD)

On , 1969, before me, _____, the undersigned officer, personally appeared RAPHAEL J. COSTANZO, known to me to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand.

_____
Notary Public

C

Pltr- Stanley Arron's Ltr & Sch ID Pl-281
EX 281-CC
~~Disc~~

STANZO ELECTRONIC INDUSTRIES, INC.
P. O. BOX 2188 – BRIDGEPORT, CONN. • AREA CODE 203-374-2000

June 5, 1962

Robert McCarthy
Senator Elec.
Flushing, NY

Dear Sir

This Battery operated BLT is a device on which a patent is pending and is being Disclosed to you for the purpose of giving you a license or selling you a finished product.

If, after an evaluation, you are not interested, please return the with your comments.

It is understood that you will keep this disclosure confidential.

Very sincerely yours,

STANZO ELECTRONIC INDUSTRIES, INC.

Stanley Arron
Exec. Vice President

SA/hmz

154

-112-

PX-282 DXZZ-2

DX-222

EX 282

3/24/66

Geo Soubin
EXEC. V.P.
SENECA KNITTING MILLS CO
450 - 7th AVE, NYC, NY

This is to Acknowledge Receipt of $1300 IN FULL
FOR WAGES DUE ME UNDER OUR CONTRACT OF
SEPTEMBER 24TH, 1965.

AS YOUR COSTS ARE NOT COMPETITIVE AND
YOU HAVE BREACHED THE CONTRACT BY NOT
KEEPING FULL AND ACCURATE RECORDS, THIS IS
MY NOTICE OF CANCELLATION OF THE
AGREEMENT, TO BE EFFECTIVE AS STATED
IN PARAGRAPH 10 ON PAGE 3.

Dx- 221
EX 283

Seneca Knitting Mills Co., Inc.

FRANCIS J. SOUHAN
PRESIDENT
GEORGE G. SOUHAN
EXECUTIVE VICE PRESIDENT

Red Jacket HOSIERY Red Top SPORTSMEN'S SOCKS
Seneca Falls, N.Y. 13148
TEL. PHONE 315 568-9441

NEW YORK OFFICE
450 7TH AVE
LA 4-9020

April 7, 1966

Mr. ron
332 Road
Bri nn.

In Socks Contract

Dear Mr. ..

This is to acknowledge receipt of your letter to Seneca Knitting Mills Co., Inc. dated March 24, 1966 acknowledging receipt of $1,300.00 from our company in full payment under the above referred to contract and also giving notice of cancellation of th contract or the reasons that our costs are not competiti ve have breached the contract by not keeping ful te records.

We do not object to the cancellation of t, however, we do deny your statement that ep full and accurate records.

This is to advise that we not only conse cancellation of the contract by you but cancel the contract on the grounds that ly do not have the "patent rights" referred contract.

Sincerely you

SENECA KNITTING MILLS CO., INC.

George G. Souhan
Executive Vice President

/ds

PX-472
EX 472
DEER STORIES
BASS STORIES

35¢ · NOVEMBER, 1955



Warning to Hunters: Early Bird Can Kill!

SUREST WAY TO GET DEER
My Score: 10 Straight

DUCKS AND GEESE: GALORE
Waterfowl Wonderland

JACK O'CONNOR IN INDIA
First Day Tiger

YOU CAN'T FIGURE BEARS
Also: Colorful Jungle

Outdoor Life 1965 Nov.

PA
492



Cooks Complete Meals—You can't cook better at home. Heat-Pal gives steady, regulated heat, easily controlled.



For Tents, Camps, Cabins—Heat-Pal provides instant, safe heat, no matter how cold the weather.

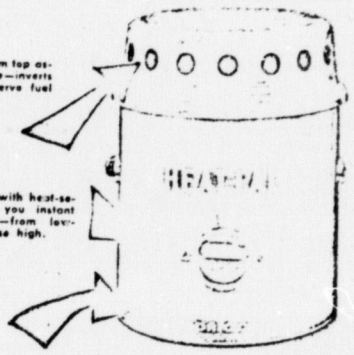


For Boats—Heat-Pal is safe anywhere — and guarantees comfort on boat deck or in cabins.

AT OUR RISK!



Special burner is crammed with nonflammable material that soaks up alcohol—burns only generated fumes—not raw fuel. This exclusive feature makes Heat-Pal the safest stove we know!



Special Hand-Spun Aluminum top assures maximum heat release—inverts to hold pots, pans or reserve fuel container.

Only heater with heat-selector gives you instant heat control—from low-low to intense high.

Unique safety feature: Bottom air-intake—keeps base of unit cool—so it's safe to place on any surface.

Try it for a full month—see what superior performance means to you!

Purely at our risk, you can get a famous Heat-Pal Stove of your choice—and see why it has been called the greatest stove of its kind—unequalled in performance for boat and ashore—indoors and out!

The only kind of heat you want is *enough* heat. The regular Heat-Pal delivers up to 3600 BTU's per hour! The Heat-Pal 5000 delivers up to 5,000 BTU's per hour!

They produce this heat almost instantly—and you can regulate the heat by an outside volume control. No other alcohol stove has this feature. They double as cook stoves, too. With Heat-Pal you can boil water fast—or simmer a stew. You can run them as heaters for as long as 20 hours on low. Or switch to any range up to high for instant high heat.

Heat-Pals use inexpensive denatured alcohol or alcohol solvent—you buy it in any hardware store—anywhere. This fuel goes into a special burner, which is crammed with absorbent non-flammable material. Heat-Pals don't burn the raw fuel, though. They burn vaporized fumes. Safest method known.

There Are Three Heat-Pal Models

Regular Heat-Pal: Red lacquered finish, upper part heavy-duty spun aluminum, has carrying strap for easy transport. Approximately 9" x 11¾" x 9". Weight 5 lbs. Delivers 3600 BTU's per hour. Runs up to 20 hours on 1½ pints of fuel. Price $19.95.

Heat-Pal 5,000. Same construction but larger size: 9" x 13¼" x 9". Weight 7 lbs. Delivers 5,000 BTU's per hour. Runs up to 30 hours on 2¾ pints of fuel. Price $27.95.

Boat Heat-Pal: Same specifications as Regular Heat-Pal but made of heavy gauge aluminum enamelled in boat blue; all working parts of brass or stainless steel. Can't rust ever. Price $24.95.

Also available: Fuel container for carrying extra fuel—2 pt. size, $2.25.

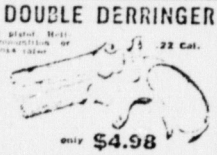
Send for Your Heat-Pal at Our Risk

Order the Heat-Pal you want to try. Fill out the coupon below and we will ship it to you at once. Try it for a full month under any conditions you choose. If it does not satisfy you in every way, return it for a full refund. Send payment for the stoves you order, plus $1 per stove to cover PP & Hdlg. charges.

You can't lose. But you *can* get the *best* all-around stove you ever used!

FRONTIER DOUBLE DERRINGER

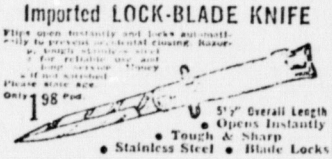
American-made blank pistol. Realistic. Lets U.S. generation of European crimped blank identical cartridges. Fires 2 quick shots from the double barrels. Looks and feels like original Remington Derringer. Perfect for any training, sporting events, etc. No permit required, but purchaser must be over 21. Not sold in Calif. or N.Y. city.



only **$4.98**

Imported LOCK-BLADE KNIFE

Flips open instantly and locks automatically to prevent accidental closing. Razor-sharp, high-carbon steel blade for reliable use and long service. Heavy duty construction. Please state age.



Only **$1.98** Ppd.

- 5½" Overall Length
- Opens Instantly
- Tough & Sharp
- Stainless Steel
- Blade Locks

Permanent Match

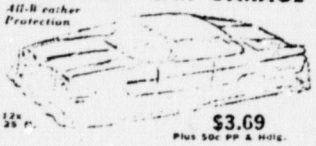
Lights Up to 10,000 Times. Ingenious mobile fire for years. Just pull it out of its chain case, strike on the side . . . it's lit! Replace into case to extinguish. Only 1¾" high. Feather-light. Ring attaches to any key chain.



69¢ ea. 2 for $1.25

PORTABLE CAR GARAGE

All-Weather Protection

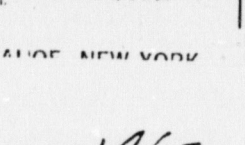


$3.09
Plus 50c PP & Hdlg.

Slips over any car or boat. Made of heavy gauge durable, clear plastic. Waterproof, weatherproof. Huge 12x25 ft. size fits every make of car. Protects in coldest weather. Tested to 90 deg. BELOW ZERO! Folds easily when not in use—stores in trunk compartment. Saves cost of rust repairs, repainting. Sure Like your car or boat protection wherever you go. AND SAVE MONEY! Also available: Super Strength—double weight plastic with 6 grommets—$5.95 plus 70¢ pp. & hdlg. 9x12 Tarp with 4 Tie-down grommets, $2.49 plus 35¢ pp. & hdlg.

More Hits Guaranteed "QUICKIE" REAR SHOTGUN SIGHT

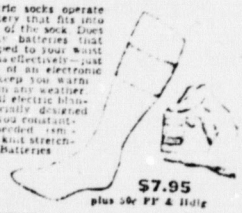
only **$2**



Famous "Quickie" by Lyman for a Rear sight for your gun without the cost of drilling or tapping. Shoots your shotgun from hunting to all sporting events. Lyman in the field and by them. Series of posts over the years. Simply slips over the breech of your gun and clamps tight. Sold only by Lyman please specify if single or double barrel.

ALL-WEATHER ELECTRIC SOCKS—Keep You Warm in Any Weather

These new electric socks operate from a tiny battery that fits into pouch at the top of the sock. Does away with bulky batteries that have to be strapped to your waist—and heats just as effectively—just as long. Product of an electronic mfr., these will keep you warm and comfortable in any weather. Operate like small electric blankets with a specially designed electrical heating you constantly. Give 3/4 heated comfort—3/4 special knit stretches to fit snugly. Batteries easily removed for washing. Only $7.95 a pair, plus 50c PP & Hdlg.



$7.95
plus 50c PP & Hdlg

MAIL HANDY ORDER COUPON NOW!

EMPIRE MERCHANDISING CO., Dept. OL-1165
125 Marbledale Rd., Tuckahoe, N. Y.

Please send me the items listed below on your guarantee of complete satisfaction. If I am not satisfied, I may return them in good condition for immediate refund. Payment enclosed $_____

_____

_____

_____

Name _____

Address _____

1965 [illegible] EMPIRE MERCH. CO. TUCKAHOE, NEW YORK

PX-474

Dec. 20, 1966 R. J. COSTANZO 3,293,405

ELECTRICALLY HEATED FOOTWEAR

Filed Sept. 13, 1965

Fig. 1

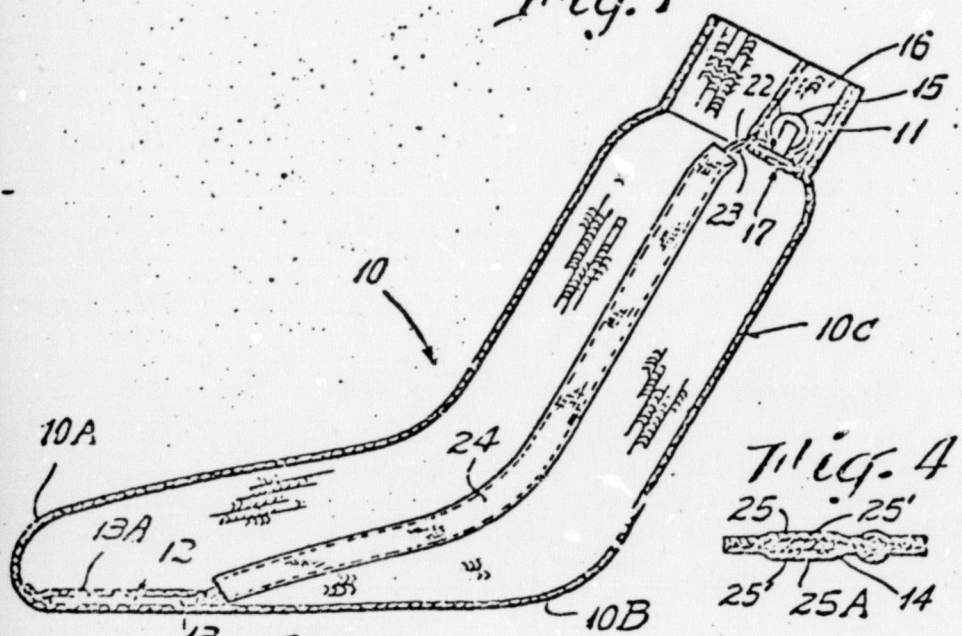


Fig. 4

Fig. 3

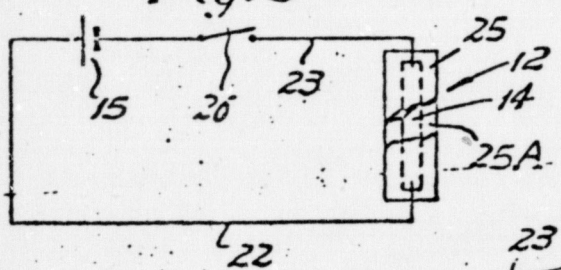
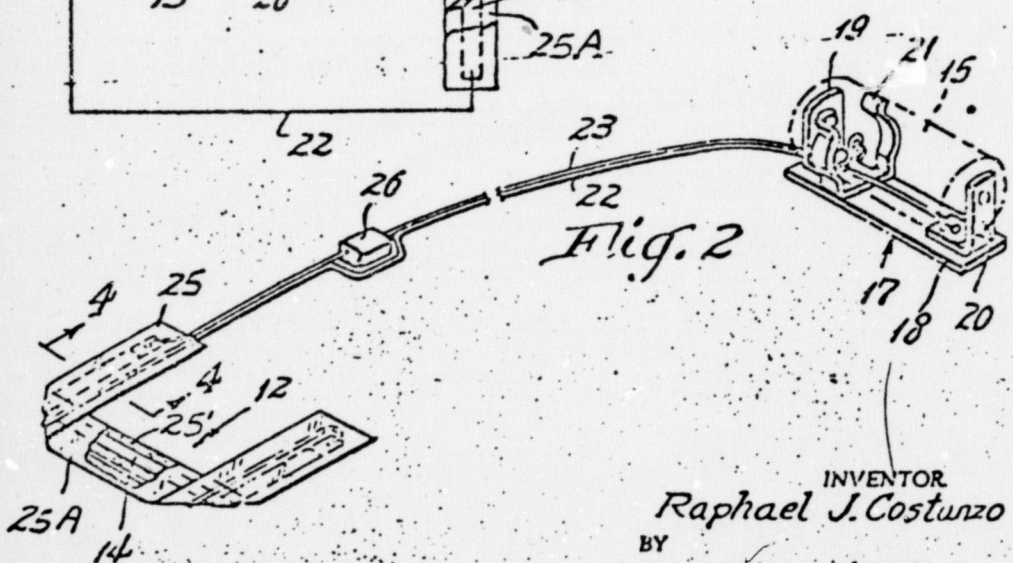


Fig. 2



INVENTOR
Raphael J. Costanzo
BY
Arthur J. Fattibene
ATTORNEY

DEFENDANTS COMMERCIAL SOCK CONSTRUCTIC

PX-47

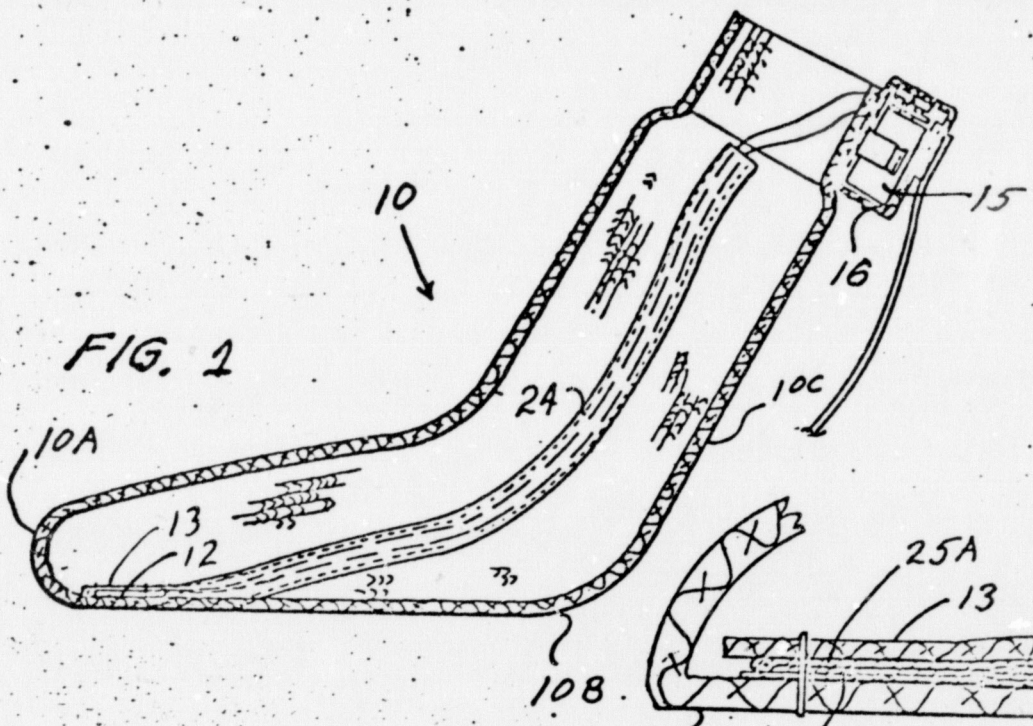


FIG. 1

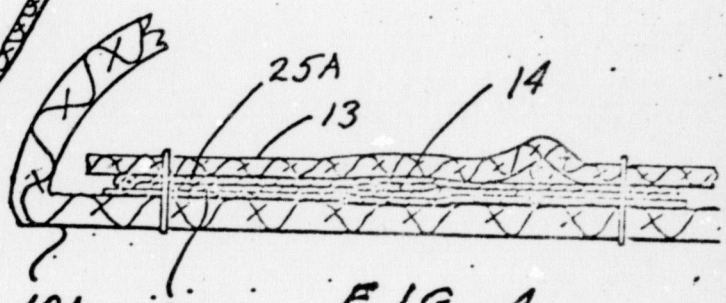


FIG. 4

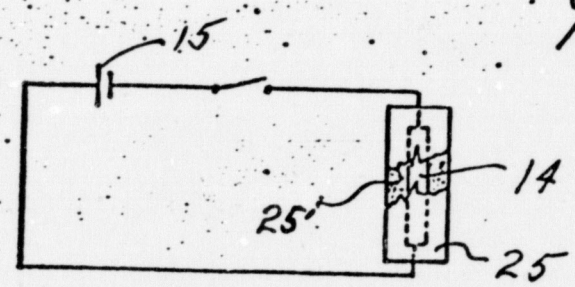


FIG. 3

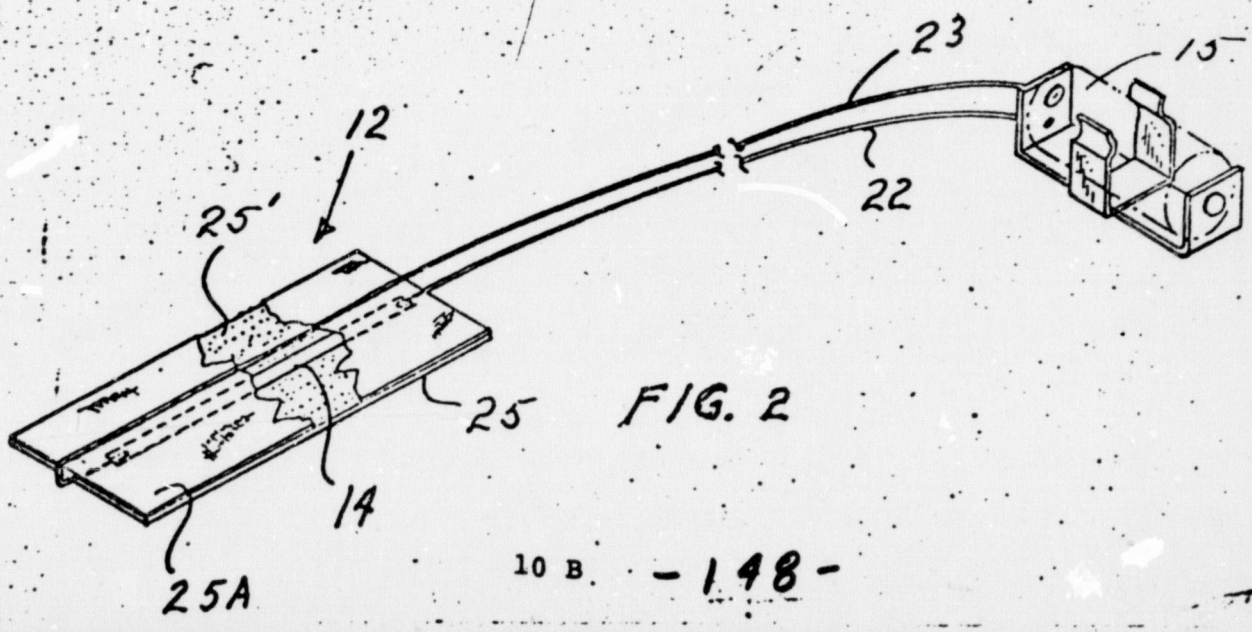


FIG. 2

CX 493

By 141

ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE



Cooks Complete Meals—You can't cook better at home. Heat-Pal gives steady, regulated heat, easily controlled.

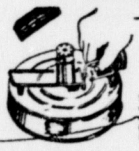


For Tents, Camps, Cabins—Heat Pal provides instant, safe heat, no matter how cold the weather.

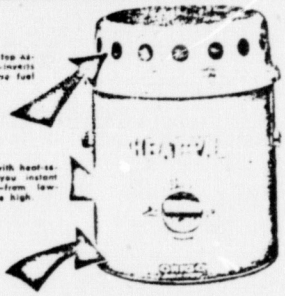


For Boats—Heat-Pal is safe anywhere — and guarantees comfort on boat deck or in cabins.

Try any of these HEAT-PAL STOVES AT OUR RISK!



Special burner is crammed with nonflammable material that soaks up alcohol—burns only vaporized fumes—not raw fuel. This feature makes Heat-Pal the safest stove you know!



Special Hand-Spun Aluminum top Assures maximum heat release—inverts to hold pots, pans or reserve fuel container

Only heater with heat-reflector gives you instant heat control—from low low to intense high

Unique safety feature. Bottom air-intake—keeps base of unit cool—so it's safe to place on any surface.

Try it for a full month—see what superior performance means to you!

Entirely at our risk, you can get a famous Heat-Pal Stove of your choice—and see why it has been called the greatest stove of its kind—unequalled in performance—afloat and ashore—indoors and out!

The only kind of heat you want is enough heat. The regular Heat-Pal delivers up to 3000 BTU's per hour! The Heat-Pal 5000 delivers up to 5,000 BTU's per hour!

They produce this heat almost instantly—and you can regulate the heat by an outside volume control. No other alcohol stove has this feature. They double as cook stoves, too. With Heat-Pal you can broil, sauté fast—or simmer a stew. You can run them as heaters for as long as 20 hours on low. Or switch to any range up to high for instant high heat.

Heat-Pals use inexpensive denatured alcohol or alcohol solvent—you buy it in any hardware store—anywhere. This fuel goes into a special burner, which is crammed with absorbent non-flammable material. Heat-Pals don't burn the raw fuel, though. They burn vaporized fumes. Safest method known.

There Are Three Heat-Pal Models

Regular Heat-Pal. Red lacquered finish, upper part heavy-duty spun aluminum, has carrying strap for easy transport. Approximately 9" x 11¾" x 9". Weight 5 lbs. Delivers 3000 BTU's per hour. Runs up to 20 hours on 1½ pints of fuel. Price $19.95.

Heat Pal 5000. Same construction but larger size: 9" x 13½" x 9". Weight 7 lbs. Delivers 5,000 BTU's per hour. Runs up to 30 hours on 2¾ pints of fuel. Price $27.95.

Boat Heat-Pal. Same specifications as Regular Heat-Pal but made of heavy gauge aluminum enamelled in boat blue; all working parts of brass or stainless steel. Can't rust ever. Price $24.95.

Also available: Fuel container for carrying extra fuel—2 pt. size, $2.25.

Send for Your Heat-Pal at Our Risk

Order the Heat-Pal you want to try. Fill out the coupon below and we will ship it to you at once. Try it for a full month under any conditions you choose. If it does not satisfy you in every way, return it for a full refund. Send payment for the stoves you order, plus $1 per stove to cover PP & Hdlg. charges.

You can't lose. But you can get the best all-around stove you ever used!

Permitted Mr. Piller called 10-5-65

FRONTIER DOUBLE DERRINGER



Only $4.98

Imported LOCK-BLADE KNIFE



Only $1.98 Pair

- 3½" Overall Length
- Opens Instantly
- Tough & Sharp
- Stainless Steel
- Blade Locks

Permanent Match



69¢ ea. 2 for $1.25

PORTABLE CAR GARAGE



$3.69 Plus 50c PP & Hdlg.

More Hits Guaranteed "QUICKIE" REAR SHOTGUN SIGHT



Only $2

ALL-WEATHER ELECTRIC SOCKS—Keep You Warm in Any Weather



$7.95 plus 50c PP & Hdlg

MAIL HANDY ORDER COUPON NOW!

EMPIRE MERCHANDISING CO., Dept. OL-1165

125 Marbledale Rd., Tuckahoe, N. Y.

Please send me the items listed below on your guarantee of complete satisfaction. If I am not satisfied, I may return them in good condition for immediate refund. Payment enclosed $ _____

Name _____

Address _____

City _____ State _____

© 1965 by EMPIRE MDSG. CO., TUCKAHOE, NEW YORK

ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE ONE MORE

VISA-THERM PRODUCTS CO. P.O. BOX 486 / BRIDGEPORT CONN. / 203-335-0721

EJ

DECEMBER 4, 1972

L-8024

PAIRS OF SOCKS SOLD

FOR YEAR ENDED 9/30/70	22,368
FOR YEAR ENDED 9/30/71	21,782
FOR YEAR ENDED 9/30/72	17,530

Obtained by mail, supposedly from S. Herron
E Jenkins

Atty Ernest Jenkins
845 Main Street
Bpt

-251-

Ex 527

Pltfs. Stanley Arron's Exh. 2 for ID.
1/30/64
C.L.

1- PX-2

A G R E E M E N T

THIS AGREEMENT, made the 5TH day of November, 1963 by and between STANLEY ARRON, of the City of Bridgeport, County of Fairfield and State of Connecticut, hereinafter referred to as "ARRON", and RAPHAEL COSTANZO, of the City of Bridgeport, County of Fairfield and State of Connecticut, hereinafter referred to as "COSTANZO",

Whereas COSTANZO is the owner of certain patents and patents in process which he wishes to market, and

Whereas ARRON has represented to COSTANZO that he has available the financial backing and means of marketing some of the items on which COSTANZO has patents or patents pending, and

Whereas the parties hereto have agreed to form a corporation for the purposes of marketing certain of the items COSTANZO has patented and certain of COSTANZO'S ideas, and each party has undertaken certain obligations, which obligations they wish reduced to a writing,

NOW, THEREFORE, IT IS MUTUALLY AGREED AS FOLLOWS:

1. The parties will immediately form a corporation under the name of "STANZO ELECTRONIC INDUSTRIES, INC." Upon formation of said corporation, the stock in said corporation will be issued fifty (50%) per cent to COSTANZO and fifty (50%) per cent to ARRON. COSTANZO will be the President of said corporation, ARRON will be the Treasurer and Vice-President of said corporation. COSTANZO'S attorney, Arthur Fattibene, of 721 Wigwam Lane, Stratford, Connecticut, will be the Assistant Treasurer of the corporation. ARRON'S attorney, Lawrence B. Schwartz, of 171 Golden Hill Street, Bridgeport, Connecticut, will be Secretary

LAW OFFICES
GLADSTONE AND SCHWARTZ
171 GOLDEN HILL STREET
BRIDGEPORT 3, CONN.

of the corporation. All four officers of the corporation will be Directors. ARRON and COSTANZO will enter into an agreement with Attorney Arthur Fattibene and Attorney Lawrence B. Schwartz, whereby they will agree to hold their attorneys harmless from any actions of the corporation.

2. Immediately upon the formation of the corporation, COSTANZO will license the corporation to exclusively market any and all uses of his patent on the "COOK-RAY STOVE", more particularly the heating element therein which will be used for a Cook-Ray Stove and for any and all other uses to which a Cook-Ray can be devoted. The corporation will have the exclusive right to license, market and manufacture the Cook-Ray element subject to termination as hereinafter provided. COSTANZO will also license to the corporation his rights, interests, and information on a "SKI DEVICE" and on a "YANKEE HICKORY SMOKER". The corporation will immediately apply for patents on the Ski Device and on the Yankee Hickory Smoker.

3. COSTANZO represents that he has also developed a "PLASTIC SWITCH" which can control the transmission of electrical energy through pressure application, and, further, that he has applied for a patent on this Plastic Switch. COSTANZO agrees that the corporation will be licensed exclusively from the date of the signing of this agreement through March 31, 1964, to market said Plastic Switch for use in the toy industry. In addition to allowing the corporation the exclusive right for said period to market the Plastic Switch for use in the toy industry, COSTANZO agrees for a period of one year after the formation of the corporation contemplated herein that he will not license or permit

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any use of the Plastic Switch in any manner, form or application unless he first offers the use or license of said Plastic Switch to STANZO ELECTRONIC INDUSTRIES, INC., who shall have the right of first refusal, which right will enable the corporation to license or market the Plastic Switch upon the same terms and conditions as that offered to COSTANZO by any other bona fide purchaser for value. COSTANZO agrees that immediately upon any offer being made to him for said Plastic Switch during the one (1) year period, he will transmit said offer to the corporation and the corporation will thereafter have a period of two (2) weeks to determine whether it wishes to market the Plastic Switch upon the same terms and conditions as offered by a bona fide purchaser. If the corporation does not exercise its rights during the two (2) week period, COSTANZO will then be free to make any arrangements he can with outsiders for this purpose; provided, that said arrangements shall not be for any lesser terms than those offered to the corporation.

4. In return for COSTANZO's making the above agreements with the corporation, ARRON agrees to immediately invest SIX THOUSAND ($6,000.00) DOLLARS in capital stock of the corporation, which capital stock will be distributed equally to ARRON and COSTANZO. FIVE THOUSAND($5,000.00) DOLLARS of this investment will immediately thereafter be paid over to Attorney Arthur Fattibene, who shall hold the same in escrow as hereinafter provided for. Said FIVE THOUSAND ($5,000.00) DOLLARS is to be paid to COSTANZO as compensation for COSTANZO licensing the corporation to market the Cook-Ray element, the Ski Device, the Yankee Hickory Smoker, and the Plastic Switch for the toy industry,

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171 GOLDEN HILL STREET
BRIDGEPORT 3, CONN.

as set forth above. It is a condition precedent to this payment, however, that COSTANZO assist the corporation in setting up a booth at the New York Boat Show to be held in January of 1964, for the purpose of displaying the Cook-Ray unit. The FIVE THOUSAND ($5,000.00) DOLLAR escrow above mentioned is to be held by Attorney Fattibene until the conclusion of the Boat Show, at which time it is to be turned over to COSTANZO absolutely and forever. The balance of the money invested will be used by the corporation to open and operate a booth at the forthcoming New York Boat Show in January of 1964. From the date of the signing of this agreement through the Boat Show, ARRON agrees to devote his best efforts and energies to arranging whatever outside financing may be necessary for the purpose of assisting the corporation in marketing its products, as well as personally doing everything and anything within his power to help the corporation develop markets for these products to the best of his ability.

5. For a period of two (2) months following the Boat Show, ARRON will have the option to either invest such additional capital in the corporation as may be necessary to enable the corporation to properly market and manufacture the Cook-Ray, Ski-Device, Yankee Hickory Smoker and Plastic Switch for the toy industry, or to sign over all of his stock and interest in the corporation to COSTANZO. If ARRON exercises this option, it is agreed and understood that ARRON will become personally committed to invest in the corporation whatever sums he and COSTANZO agree are necessary to enable the corporation to properly market and manufacture the above items. It is agreed and understood by and between the parties hereto that at no time and under no circumstances is ARRON to be construed as being under an obligation to

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invest more than TEN THOUSAND ($10,000.00) DOLLARS over and above the SIX THOUSAND ($6,000.00) DOLLARS required by paragraph four hereof, in this venture.

6. Should ARRON elect to exercise his option of making this additional investment, then and in such event the corporation, during its existence, shall continue to have the exclusive license to market the Cook-Ray, Ski-Device and Yankee Hickory Smoker. All profits of the corporation are to be divided equally by ARRON and COSTANZO during the life of the corporation.

7. Immediately upon the dissolution or bankruptcy of the corporation, the patent on the Cook-Ray unit and all patents pending on the Ski-Device and Smoker are to revert to COSTANZO and the corporation will have no further rights thereunder. The agreement between COSTANZO and the corporation is to contain a standard reversionary clause to this effect. In addition to the licensing of the corporation on his ideas and patents above mentioned, COSTANZO agrees, during the period of the corporation's existence, to devote his best efforts toward developing, production and manufacture of the Cook-Ray stove, Ski-Device and Hickory Smoker. It is understood and agreed that the corporation will not acquire any shop right, interest or license in or to any other ideas, inventions or patents developed or conceived by COSTANZO without written consent to the contrary by COSTANZO.

8. Of any money advanced to the corporation by ARRON himself, the first SIX THOUSAND ($6,000.00) DOLLARS of said advance shall be considered as a capital stock investment, which capital stock investment shall be owned equally by COSTANZO and ARRON. Any advances of ARRON over and above this SIX THOUSAND ($6,000.00) DOLLAR capital stock investment shall be considered a

LAW OFFICES
GLADSTONE AND SCHWARTZ
171 GOLDEN HILL STREET
BRIDGEPORT 3, CONN.

loan to the corporation by ARRON. In the event of a dissolution of the corporation or a cessation of the corporation's business, the assets of the corporation are to be distributed in the following manner:

(a) If said dissolution is in the first year, after the creditors have been paid, all additional assets of the corporation are to be distributed to ARRON until he has received back the full amount of his loans and his initial capital investment, except for the licenses and patents which are to revert to COSTANZO. Any assets still remaining in the corporation beyond this reimbursement to ARRON are to be divided equally by ARRON and COSTANZO.

(b) If the dissolution takes place after the first year of the corporation's existence, the assets are to be first used to pay creditors of the corporation and thereafter to reimburse ARRON for his investment and loan to the corporation. Any assets remaining after said reimbursement are to be split equally between ARRON and COSTANZO.

9. Upon dissolution as set forth above for any reason whatsoever, then all patents assigned by COSTANZO to the corporation and licenses given by COSTANZO to the corporation and any and all ideas contributed by COSTANZO to the corporation are to revert to him and to remain and be his property forever. Any and all licenses he has granted to the corporation shall immediately cease

10. Any dispute under this agreement shall be settled by arbitration in accordance with the then prevailing rules of the American Arbitration Association , and the arbitrator's decision on such dispute shall be final.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals to this instrument and to a duplicate of the same tenor and date, this 5TH day of NOVEMBER, 1963.

Ram B Schwartz -156-

Arthur F. Fattibene -6-

Robert J. Costanzo

LAW OFFICES
GLADSTONE AND SCHWARTZ
171 GOLDEN HILL STREET
BRIDGEPORT 3, CONN.

PLAINTIFF'S EXHIBIT
535
~~IDEN~~ ADM
11864 Civil

Px - 536

OFFICERS OF CORPORATION (AS OF DATE OF THIS REPORT)

NAME	BUSINESS ADDRESS	RESIDENCE ADDRESS	SIGNATURE AUTH.
PRES. Stanley Arron	3323 Old Town Rd., Bpt. Ct.	same	X
V. PRES. Max Arron	"	"	X
V. PRES.	"	"	
TREAS. Stanley Arron	"	"	
ASS'T TREAS.			X
SEC'Y. Anna Arron	"	"	
ASS'T SEC'Y.			X

OTHER DIRECTORS OF CORPORATION (IF NOT CHECKED ABOVE)

If above space is not adequate for officers and directors, enclose two copies of a separate list. Do not staple to card. CHECK HERE ☐ Two copies of separate list enclosed

V84900 VISA-THERM PRODUCTS INC

STATE OF CONN. ANNUAL REPORT-STOCK CORPORATION 1967 D

File on or before March 1st with SECRETARY OF STATE, HARTFORD, CONN. 06115

STOCK DESIGNATION	NUMBER	CLASS	SERIES	PAR VALUE	$ ARE THESE SHARES FULLY PAID?
1. Shares issued	100	common		$10.	☒ YES ☐ NO
2. Shares outstanding	100	common		$10.	6. IF NOT ENTER AMOUNT UNPAID $
3. Corporate treasury shares	none				
4. Shares issued since last annual rpt.	none				

FORM 8-113 (10-66)

ORIGINAL

Fill in all three cards. Keep card marked YOUR COPY. Return other two in envelope provided.

MAILING ADDRESS (If incorrect, show changes here)

VISA-THERM PRODUCTS INC
STANLEY ARRON
3323 OLD TOWN RD
BRIDGEPORT CONN

Rec'd 3/28/67 12:58 pm

TOWN CODE 015

11-66 DATE OF INC. (AUTH.)

PRINCIPAL OFFICE ADDRESS IN CONN.

3323 Old Town Rd., Bridgeport, Conn.

ADDRESS OF EXECUTIVE OFFICES (FUNCTION CORPORATION ONLY)

IS THIS A CHANGE SINCE LAST REPORT? YES ☐ NO ☒

IS THIS A CHANGE SINCE LAST REPORT? YES ☐ NO ☐

PRIOR PRINCIPAL OFFICE ADDRESS IN STATE WHERE INCORPORATED (PRINT OR COMP. ONLY) IS THIS A CHANGE SINCE LAST REPORT? YES ☐ NO ☐

I declare, under the penalties of perjury, that the statements made in this report are true, correct and complete to the best of my knowledge and belief.

DATE OF THIS REPORT 2/22/67 TITLE OF OFFICER Pres.

SIGNATURE

ACCOUNT NUMBER

BE SURE TO COMPLETE REVERSE SIDE
DO NOT FOLD, BIND, TEAR OR PERFORATE THIS CARD

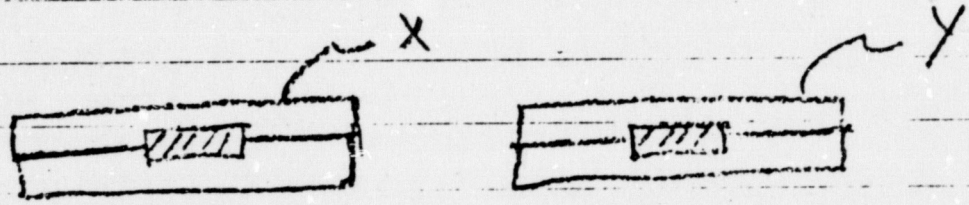
Plfs.- Stanley Arron's Exh. 7 for ID
12/30/68
EL

VT PX-7

PLAINTIFF'S EXHIBIT
539
~~IDEN.~~
11864 Civil

A

B



F18

F 18

UNITED STATES DISTRICT COURT
DISTRICT OF CONNECTICUT

TOWLY PRODUCTS CORP. et al,

Plaintiffs

vs

Civil Action 11864

[illegible] ARRON et al,

Defendants

AFFIDAVIT OF DENNIS J. MURPHY
FOR PLAINTIFFS

State of _____

County of _____

I, DENNIS J. MURPHY, being duly sworn, deposes and says:

1. I am a graduate Electrical Engineer having received a B.S. in Electrical Engineering degree from Chicago Technical College in Chicago, Illinois, and who has for the last eleven years specialized in the design and manufacture of electrically heated products and their associated controls.

2. From 1957 to 1961 I was Chief Products Engineer for Northern Electric Company, Chicago, Illinois, and that the list of products manufactured by this company and with which I was concerned included hair curling irons, electric blankets, electric heating pads, electric battery-operated socks, electric vaporizers, electric baby food warmers and specialty heaters and controls.

3. From 1961 to 1964 I was a Supervisor Control Devices Engineer for Casco Products in Bridgeport, Connecticut

and Superintendent and Plant Manager for Stanholls Company, Beacon, New York, a division of Standard-Kollsman. The specialties and products with which I was concerned during this employment were electric heating pads and blankets.

4. During 1964 and 1965 I was Vice President of Mt. Beacon Industries, which manufactured electric blankets.

5. I am presently President of Excelsior-Beacon Corporation, manufacturing battery-operated electric products.

6. I am thoroughly familiar with the construction of both the Loctra-Sox manufactured by Timely Products and the battery sock manufactured by or for Visa-Therm Products; and that I have made a thorough comparison of both socks and tested both socks.

7. Timely Products' sock uses a sandwich type heater construction disposed in the toe portion of the sock in which a tape is disposed in heat conducting relationship to an electric resistance element of flat resistance wire. The Timely Product sock has the tape material in intimate contact with the heater source.

8. Visa Therm sock also employs a tape in heat conducting relationship to a flat electrical resistance wire.

9. Both Timely Products' sock and Visa Therm's sock use a flat ribbon alloy to generate heat in the toe area of the sock to conduct heat to the tape in contact therewith. The ribbon type heater in both cases is attached to conductors.

10. Both Timely Products' sock and Visa Therm's sock use a 1-1/2 volt dry cell type battery as an energy source wherein the battery is located in a pocket or pouch adjacent the hem portion of the sock.

11. Both Timely Products' sock and Visa Therm's sock use a sandwich type heater construction with an opaque material to cover the heater. By use of the sandwich material in heat transfer relationship to the heater element itself, almost 100% of the heat is transferred from the resistor element to the sandwich material by conduction.

12. There is no basic difference of generating or transmitting heat in either sock.

13. The size and length of the respective resistance element in the respective socks, i.e. Timely Products' sock and the Visa Therm sock has little bearing as both utilize substantially the same size elements.

14. Increased heater length will increase resistance and decrease heat output. If the resistor element is shortened electrical resistance would decrease and heat output would increase. However due to the limited life of the dry cell batteries used there is determined a practical limit to the amount of heat generated for a specific period of time. The size of the resistor element does not alter the manner in which heat is transmitted to the tape, as the size of the heater only controls the amount of heattransmitted, and not the manner in which it is transmitted.

15. Comparison tests run by me using a standard fold test wherein the respective socks were powered by similar alkaline type dry cell batteries yielded similar results. Peak temperatures of 190° to 195° were exhibited.

16. Battery life in the Timely Products' sock varied between 3-1/2 to 4 hours. Battery life in the Visa

Therm sock varied between 2-1/2 to 3 hours. This would indicate that the electrical resistance of the Visa Therm resistor element was somewhat less thereby causing a greater drain to be placed on the battery.

17. The tape material used in the Timely Products' sock and in the Visa Therm sock while formed of different material nevertheless function to conduct the heat away from the resistor element and to the foot of the wearer. The tapes employed in Timely Products' sock and Visa Therm's sock are of an opaque material located in heat transfer relationship to the resistor element or heat source in which transmission of the heat can only occur by conduction.

18. The tape used in the Visa Therm sock is the mechanical equivalent to the tape used in Timely Products' socks because it functions in the same manner for the same purpose to achieve the same results.

19. The tape of the Visa Therm sock conducts the heat away from the resistor element and it does not insulate the heater as insulation is generally understood. Insulation of the resistor element would render Visa Therm's product inoperative as any insulation of the resistor element prohibits the transmission of any heat generated by the resistor element to the foot of the wearer.

_____
Dennis J. Murphy

Sworn and subscribed before me
this _____ day of _____, 1968.

_____
Notary Public

TIMELY PRODUCTS CORPORATION
305 RAILROAD AVE. • BRIDGEPORT, CONN. 06601 • 203-368-6531

DX-DD10

min M. Hines, *President*

June 23rd, 1966

O: ALL SALES AGENTS

UBJECT: LECTRA-SOX - BULLETIN #2

have passed on news of certain favorable developments to some of u.....and the purpose of this bulletin is to make sure that all e equally informed.

Coverage of U. S. Now Complete

r first two agents (14 Northeastern and 4 upper Mid-West states) were pointed shortly after the first of the year. We deferred further pointments until trade reaction and sales results showed that, as we l thought, in Lectra-Sox "we really had something."

ring recent weeks, we have selected what we believe to be the finest oup of agents in the business to cover the rest of the country, and a st is attached for your use in case you have need to get in touch with e of your neighbors who is handling the line.

New Package

t of you have, by now, received samples of the new Lectra-Sox package. is more dramatic and colorful in design, sturdier in construction than first carton, and we are enthusiastic over the increased sales impact is bound to have on both trade and consumer.

Improved Socks

samples of Lectra-Sox just sent you, represent the 1" longer length, nter weave and heavier weight that will be shipped to the trade on ck orders.

construction is changed in that the heating element is placed beneath lon strip which, our tests confirm, allows a noticeably greater trans- of heat to the toes. (Our premise: Keep the toes warm and you keep whole foot warm.)

-more-

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4. New Manufacturing Arrangement

Until it is appropriate to set up our own plant, Lectra-Sox will be made on a sub-contract basis.

The concern that has produced Lectra-Sox for us up to now has fallen short in both quality control and speedy shipment of samples to the trade.

Accordingly, we have just completed arrangements for forthcoming production to be handled by Casco Products Corporation of Bridgeport. This company is well known as the maker of famous Casco Heating Pads and numerous other electrical products. The Casco plant employs over 600 people and company skills and product experience insure high standards and dependability in manufacturing Lectra-Sox.

We believe you will see in news of this arrangement further assurance of the substantial resources behind our product.

(Until further notice, continue to send all orders and correspondence to our present address.)

. . . . . .

We are enthusiastic over these improvements in product, package and production arrangements which we are sure will be reflected in even greater trade acceptance of Lectra-Sox than heretofore experienced in the limited areas where it has been introduced.

And so far, that acceptance has been close to sensational!

Benjamin M. Hines

BMH/mw
Enclosure: Sales Representative List

TIMELY PRODUCTS CORPORATION
305 RAILROAD AVE. • BRIDGEPORT, CONN. 06601 • 203-368-6531

nin M. Hines, *President*

SALES REPRESENTATIVES

Territory	Agent
Kentucky, Mississippi, Alabama, Georgia, Florida, Tennessee, North Carolina and South Carolina	Hank Bruns Company 2450 West Wesley Road, NW Atlanta 5, Georgia
California, Arizona, New Mexico Colorado, Utah, Nevada and Hawaii	Al Fisher and Associates P. O. Box 5380 Sherman Oaks, California
Texas, Oklahoma, Louisiana and Arkansas	W. C. Morris & Associates 2518 Times Boulevard Room 102 Houston, Texas 77005
All New England, All New York and Long Island, New Jersey, Pennsylvania, Maryland and D.C., Delaware, Virginia and West Virginia	Moulton, Stevens & Nelan Sales Associates, Inc. Exton, Pennsylvania 19341
Alaska	Harry W. Olsen & Company P. O. Box 1136 Anchorage, Alaska 99501
Minnesota, Wisconsin, North Dakota and South Dakota	Robco Associates 3000 James Avenue, South Minneapolis, Minnesota
Michigan, Illinois, Indiana and Ohio	Kirk Timm and Associates 2317 Gysin Court Bay City, Michigan
Missouri, Kansas, Iowa and Nebraska	John E. Walsh 406A Merchandise Mart 2201 Grand Avenue Kansas City, Missouri 64108
Washington, Idaho, Oregon, Montana and Wyoming	Gillard-Sneyd-Chase Company 6600 N. E. Portland Highway Portland, Oregon 97218

June 23, 1966

Ox 1412

January 6, 1967

Mr. Stanley Arron
P.O. Box 486
Bridgeport, Connecticut

Reference L-8024 - U.S. Patent No. 3,293,405 granted to R.J. Costanzo on December 20, 1966 and entitled Electrically Heated Footwear

Dear Stanley:

I have studied the above-noted patent in light of the structure of both the heated sock which you sold last year and your improved heated sock. It is my opinion that neither one of your heated socks infringes this patent.

In order for a patent to be infringed, it is necessary that every element of structure or its substantial equivalent called for in at least one claim be found in the accused device.

There are four claims in the patent. As to the claims, claims 1 and 2 each calls for in substance "radiation means for defining an expanded radiation surface for the heater" including "a pair of heat conducting sheets" while claim 3 includes this limitation but is more specific and states that it is "metallic foil". Claim 4 also includes the limitation of claim 2 plus the use of adhesive means for securing the "heat conducting strips" to the resistor strip.

Neither one of your socks has heat conducting sheets for increasing the heat transfer surface of the heater and thus there is no infringement. Your socks do not have or in fact do not need heat conducting sheets because there is sufficient heat transfer area without them and also because foil sheets are uncomfortable, crack and will not tolerate washing or flexing.

167

As you know, we have filed patent applications on your construction which in my opinion are patentable over the lock disclosed in the above-noted patent.

If you have any questions, please do not hesitate to call.

Very truly yours,

EMJ:k

Left "E" 8-19-69 ajs dlj Hines

D-MN^NN

December 30, 1966

Mr. Francis J. Gudisen, President
Timely Publishing Mills
Carmen Mills, New York 13140

Re: U. S. Letters Patent No. 3,293,403

Dear Mr. Gudisen:

I am writing this letter on the behalf of Timely Publications.

As a [illegible] author of various books, [illegible] is interested, as a matter of interest, to the above-identified U.S. patent, a copy of which is enclosed for your convenience. You will note that this patent covers a battery operated heated sock in which the battery is carried in a pocket adjacent the upper end of the sock. Timely Publications is the exclusive authorized licensee of the above-identified patent.

I trust that you will find this patent of interest. Should you have any particular interest in this patent, feel free to [illegible].

Very truly yours,

Arthur T. Ba[illegible]

December 30, 1968

Harry's Sporting Goods, Inc.
250 Fairfield Avenue
Bridgeport, Connecticut

Attention: Store Manager

Re: U. S. Letters Patent No. 3,293,403

Dear Sir:

I am writing this letter in the behalf of a client who has just been issued United States Letters Patent No. 3,293,403 for an electrically heated sock. This patent covers an electrically heated sock which is energized by a single flashlight battery carried in a pouch adjacent to the hem of each sock. The advantages of the patented construction are that long lengths of wires are eliminated and that the heater can be energized by a 1.5 volt battery. Prior to this invention, no other known electrically heated socks were capable of these advantages. This construction is completely unique to my client as evidenced by the patent granted thereon.

No form sheet has been sold or authorized licensee of this patent, and such authorized licensee is currently manufacturing and distributing this patented sock construction under the trademark "Thermo-Sox." "Thermo-Sox" has proven to be commercially successful, and is nationwide the only patented sock of its kind in the world.

Inquiry is therefore made as to whether or not you might be interested in handling this original, patented "Thermo-Sox" so that you may have an item which no other retailer can.

170

Your prompt response to this inquiry will be appreciated.

For your convenience a copy of the above-noted patent is enclosed.

Very truly yours,

Arthur T. Fattibene

Enclosure

ATF:cal

NN2
NN2

December 30, 1964

William Nodell
500 Fifth Avenue
New York, New York

Re: U. S. Letters Patent No. 3,293,406

Dear Sir:

I am writing this letter on the behalf of a client who has just been issued United States Letters Patent No. 3,293,406 for an electrically heated cook. This patent covers an electrically heated cook which is energized by a single flashlight battery carried in a pouch adjacent to the handle of the cook. The advantages of the patented construction including long lengths of wires are eliminated and that the heating is energized by a 1.5 volt battery. Prior to this invention, other known electrically heated cooks were capable of these advantages. This construction is completely unique to my client as evidenced by the patent granted thereon.

To date there has been only one authorized licensee of this patent, and such authorized licensee is currently manufacturing and distributing this patented cook construction under the trademark "Electro-Sauce." "Electro-Sauce" has proven to be commercially successful, and is consequently the only authorized cook of its kind in the trade.

As you are no doubt aware, every successful new product, is followed by many imitators. Quite frequently the first imitators are former associates of the originators of the new products. In such cases such former associates are frequently guilty of unfair competition and unlawful appropriation of the originator's inventions and ideas.

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[illegible] the "Electro-Bar" is the only [illegible] manufactured under license from the inventor and owner of said patented unit, and that any similar electric rack sold under any other name constitutes an infringement and copy thereof. Any copy or imitation, if manufactured by any former associate of the "Electro-Bar" inventor, may well render such manufacturer liable for unfair competition.

Inquiry is therefore made as to whether or not you might be interested in handling the original, patented "Electro-Bar" and/or whether or not you may know of the most name, sold or used any similar unit.

Your prompt response to this inquiry will be appreciated.

For your convenience a copy of the above-noted patent is enclosed.

Very truly yours,

Arthur V. Pettibone

Enclosure

AVP:mlb

NN3
NN3

OFFICES OF
ARTHUR T. FATTIBENE
PATENT ATTORNEY
655 MADISON AVENUE
NEW YORK, NEW YORK 10021
(212) 688-7200

BRIDGEPORT, CONN.
137 ELM STREET
TEL. 335-6224
259-0033 (CODE 203)
WASHINGTON, D. C.
711 FOURTEENTH STREET, N. W.

U. S. AND FOREIGN
PATENTS, TRADEMARKS
AND COPYRIGHTS

December 30, 1966

Alexander Sales Corporation
125 Marbledale Road
Tuckahoe, New York 10707

Attention: President

Re: U. S. Letters Patent No. 3,293,405

Dear Sir:

I am writing this letter in the behalf of a client who has just been issued United States Letters Patent No. 3,293,405 for an electrically heated sock. This patent covers an electrically heated sock which is energized by a single flashlight battery carried in a pouch adjacent to the hem of each sock. The advantages of the patented construction are that long lengths of wires are eliminated and that the heater can be energized by a 1.5 volt battery. Prior to this invention, no other known electrically heated socks were capable of these advantages. This construction is completely unique to my client as evidenced by the patent granted thereon.

To date there has been only one authorized licensee of this patent, and such authorized licensee is currently manufacturing and distributing this patented sock construction under the trademark "Lectra-Sox." "Lectra-Sox" has proven to be commercially sucessful, and it constitutes the only patented sock of its kind in the trade.

As you are no doubt aware, every successful new product, is followed by many imitators. Quite frequently the first imitators are former associates of the originator of the new product. In such cases such former associates are frequently guilty of unfair competition and unlawful appropriation of the originator's inventions and ideas.

By this letter you are advised that "Electra-Sox" is the only authorized product manufactured under license from the inventor and creator of this patented sock, and that any similar electric sock sold under any other name constitutes an imitation and copy thereof. Any copy or imitation, if manufactured by any former associate of the "Lectra-Sox" inventor, may well render such manufacturer liable for unfair competition.

Inquiry is therefore made as to whether or not you might be interested in handling the original, patented "Lectra-Sox" and/or whether or not you may have in the past made, sold or used any similar sock.

Your prompt response to this inquiry will be appreciated.

For your convenience a copy of the above-noted patent is enclosed.

Very truly yours,

Arthur T. Fattibene

Enclosure

ATF:smb

March 11, 1907

Miss Emma Cleaveland
23 Fairfield Avenue
Bridgeport, Connecticut

Re: Infringement of U. S. Letters Patent No. 842,470

Dear Miss Cleaveland:

This is to advise you that
Graduate Corporation
your property,
and/or is doing business
operates electrically
Electric Co. is prepared

In the meantime, inasmuch as you and your
Graduate Co. are further considering, use and/or sale of
electrically heated seats which infringe the above-identified
patent, and pending your acceptance or rejection of
according of all rights under said patent and full cause of action
date of the present, and final consideration for such infringement
be made. Unless you and your representative are prepared to
settle, and all further use of the invention of the above-
identified patent will cease. I have been authorized to pursue
the necessary legal remedies to enforce the above-identified
rights.

I trust that you will give this matter your prompt attention
and that an effective and complete settlement will be made. I am sure
that future will appear to this in order.

Very truly yours,

Arthur W. Marshall

ONLY COPY AVAILABLE

NNS NW 5

April 8, 1967

Mr. & Mrs. Max Aaron
2323 Old Town Road
Bridgeport, Connecticut

Dear Max and Anne Aaron,

I have been advised by Attorney Schwartz that you are officers and directors of Visa-Therm Products, Inc. As you probably know, Visa-Therm Products, Inc. is manufacturing and distributing an electric sock which is considered to be an infringement of U. S. Letters Patent No. 3,293,405 of my client, Raphael J. Costanzo.

Please be advised that further manufacture and sale of Visa-Therm's electrically heated sock will be considered a willful infringement of my client's patent rights. Unless this infringement ceases I have been authorized to institute legal proceedings to enjoin further infringement by you and/or Visa-Therm Products, Inc.

Very truly yours,

Arthur T. Fattibene

ATF:smb

NWG

May 1, 1967

Mr. G. Valentine Miller
President
Lafayette Bank & Trust Co.
203 Penn Avenue
Lafayette, Connecticut

Re: U. S. Patent Letters No. 3,230,105

Dear Mr. Miller:

Please be advised that I represent Mr. Ray Fontaine and Timely Products Corporation, his exclusive licensee of the above-identified patent. This patent covers a self-contained, electronically heated and energized by a 12-volt battery.

As you may or may not know, my clients have instituted Civil Action No. 11867 in the United States District Court for the District of Connecticut against Stanley Arron, Max Arron, Anna Arron and Vi-Therm Products, Inc. alleging infringement of the above-identified patent, misappropriation of the invention covered by said patent, and unfair competition.

It has come to the attention of my clients that your bank to a very substantial degree has been instrumental in encouraging and/or permitting the Arrons and/or Vi-Therm Products, Inc. to commit and/or to continue the unlawful acts complained of in the above-identified suit. The action of your bank in loaning and/or financing the Arrons and/or Vi-Therm Products, Inc. with the full knowledge that the Arrons and/or Vi-Therm Products, Inc. are using such monies for the express purpose of manufacturing and selling electric socks which infringe the claims of my clients' patent, no. 3,230,105, constitute acts of contributory infringement.

Please be advised that the U. S. Patent Law, 35 USC 271(b) expressly state:

> "Whoever actively induces infringement of a patent shall be liable as an infringer."

It is, therefore, requested that your bank immediately cease and desist the continued financing and/or otherwise loaning of monies to the Arrons and/or Visa-Therm Products, Inc. and/or any one in privy with them for the express purpose of manufacturing and/or selling electric socks which infringe the claims of the above-identified patent. Unless you can assure my clients in writing that your bank will immediately cease its loaning and/or financing of the Arrons and/or Visa-Therm Products, Inc., for the express purpose of manufacturing and/or selling infringing electric socks, I will have to advise my clients that they must look to judicial process for redress.

Your prompt attention to this matter is urged.

I trust that you will be able to immediately assure my clients in writing that your bank will cease these acts my clients consider contributory to the infringement of the above-identified patent and a violation of 35 U.S.C. 271(b).

Very truly yours,

Arthur T. Fattibene

ATF:mb

NN7

October 2, 1967

The Beerskin Trading Post
Route 1 at 114
Danvers, Massachusetts 01923

Attn.: President

Re: U. S. Letters Patent No. 3,293,403 and Federal
Trademark Registration for the Mark LECTRA-SOX

Dear Sir:

I am writing this letter on the behalf of my client who has been recently issued U. S. Letters Patent No. 3,293,403 for an electrically heated sock. This patent covers an electrically heated sock which is energized by a single flashlight battery carried in a pouch adjacent the hem of the sock. The advantages of the patented construction are that long lengths of wire are eliminated and the heater in the toe portion of the sock is energized by a 1.5 volt battery. Prior to this invention no other known electrically heated socks were capable of these advantages. This construction is completely unique to my client as evidenced by the U. S. patent granted thereon.

To date there has been only one authorized licensee of this patent and such authorized licensee is currently manufacturing and distributing this patented sock construction under the trademark LECTRA-SOX. The electric sock has proven to be commercially successful and it constitutes the only patented sock of this kind in the trade.

It has come to my client's attention that in your publication Beerskin Trading Post 1967-1968 there appeared on page 61 thereof an advertisement of SKI-LECTRIC SOCKS. I am, therefore, inquiring on the behalf of my client as to whether you can advise me at this time from whom your company is purchasing the SKI-LECTRIC SOCKS advertised on page 61 of your 1967-68 edition of your Beerskin Trading Post.

Inquiry to learn whether or not the sockets sold by [illegible] are purchased from an authorized licensee and that if such sales occur within the claims of the above-identified patent, unauthorized sale and/or use of such sockets may be considered as infringement of the above-identified patent.

Also, unless such sockets are purchased from an authorized licensee of my client, any use and/or sale of electric sockets which come within the scope of my client's patent will constitute an infringement thereof.

Therefore, if you would be so kind as to advise us from whom you are purchasing the electric sockets advertised on page 61 of your 1957-1958 edition I will then be able to advise you as to whether or not you are handling the sockets on an authorized licensee.

In the event that such sock is not the product of an authorized licensee, a question of possible patent infringement may arise as a result of offering such socks for sale.

I trust that you will realize the urgency of promptly advising us from whom you are purchasing the electric socks being offered for sale on page 61 of your recent catalog.

Very truly yours,

Arthur T. Pattiben

ATP:mb

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WW 8

October 12, 1967

Casual Living
108 Chatsworth Avenue
Larchmont, New York 10538

Attention: President

Re: Letters Patent No. 3,293,405

Dear Sir:

I am writing this letter on the behalf of my client who has recently been issued U. S. Letters Patent No. 3,293,405 for an electrically heated sock.

This patent covers an electrically heated sock which is energized by a single flashlight battery carried in a pouch adjacent to the hem of the sock. The advantages of the patented construction are that long lengths of wires are eliminated and that the heater in the toe portion of the sock is energized by a low-voltage battery which may be either a standard flashlight battery, an alkaline battery, a nickel cadium battery, or a rechargeable battery. Prior to this invention no other known electrically heated sock was capable of these advantages. This construction is completely unique to my client, as is evident by the above-identified U. S. patent granted thereon, a copy of which is enclosed for your convenience.

To date there has only been one authorized licensee of this patent and such licensee is currently manufacturing and distributing this patented sock construction under the trademark, ZZZZZZ-TOE. This electric sock has proven to be commercially successful, and is considered the only patented sock of its kind in commerce.

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It has recently come to my client's attention that in your publication, Casual Living, there appeared on page 13 an advertisement of electric socks, catalogue no. 8134.

I am, therefore, inquiring on the behalf of my client, as to whether or not you can advise me at this time from whom your company is purchasing electric socks of the type disclosed on page 13 of your catalogue and which are indicated as retailing for $10.00 per pair.

Inquiry is being made at this time for the reason that if such socks are not purchased from an authorized licensee and if such socks come within the claims of the above-identified patent, any unauthorized sale and/or use thereof may be considered an infringement of the above-identified patent.

Please be advised that unless such socks are purchased from an authorized licensee of my client, then any use and/or sale of such socks which come within the scope of my client's patent, a copy of which is enclosed, will be considered an infringement thereof.

Therefore, if you would be so kind as to advise me from whom you are purchasing the electric socks advertised on page 13 of your recently issued Casual Living catalogue, I will then be able to advise you as to whether or not you are handling the sock of an authorized licensee.

In the event that such sock is not the product of an authorized licensee, a question of possible infringement may arise as a result of your offering such socks for sale. I trust that you will realize the urgency and promptness necessary for you to advise me from whom you are purchasing the electric socks being offered in your catalogue.

Very truly yours,

Arthur T. Fattibene

ATF:mb

Enclosure

HWG
HNG

October 23, 1957

Clifton Elliott
Elliott Brothers
Clinton, South Carolina

Re: U. S. Patent No. 2,293,493

Dear Mr. Elliott:

I am writing this letter on the behalf of my client who has recently been issued U. S. Letters Patent No. 2,293,493 for an electrically heated sock.

This patent covers an electrically heated sock which is supplied by a single flashlight battery carried in a pocket adjacent the knee portion of the sock. The advantages of the patented construction are that long lengths of wires are eliminated and that the heating in the toe portion of the sock is able to be supplied by a flashlight battery which may be either a standard flashlight battery, an alkaline battery, a nickel cadmium battery or a rechargable battery. Prior to this invention no other known electrically heated sock was capable of operating on such low-voltage batteries.

This construction is completely unique to my client as is evidenced by the grant of this U. S. patent application thereto, a copy of which is enclosed for your convenience.

To date, there has been only one authorized licensee of this patent; any such licensee is currently manufacturing and distributing their patented sock construction under the trademark Miraflex. This client is proud to be currently successful and to contribute the only patented sock of its kind in America.

It has recently come to my client's attention that you have catalogued and that you are contemplating cataloguing an electric cook for sale. I am, therefore, inquiring on the behalf of my client as to whether or not you can advise me at this time from whom you or your company has or is purchasing electric cooks of the type offered and/or being offered for sale by your company. Inquiry is being made at this time for the reason that if such cooks are not purchased from an authorized licensee and that if such cooks come within the claims of the above-identified patent, the unauthorized sale and/or use thereof may be considered as an infringement of the enclosed patent.

It is, therefore, suggested that unless you purchase your electric cooks from an authorized licensee, you consult your attorney before making, using or selling cooks manufactured and/or supplied by others than my client's authorized licensee. I have been authorized to vigorously enforce the enclosed patent.

Therefore, if you have any regard for the patent rights of others, I am sure that you will not knowingly infringe the same by selling any such cooks which do not originate from an authorized licensee. I, therefore, trust that you will withdraw your best discretion with respect to this matter and that you will immediately advise me from whom you have secured the electric cooks which have been or are being offered for sale by your company.

Very truly yours,

Arthur T. Fairbairn

ATF:tmb

Enclosure

185

November 2, 1967

President
Hygrade Cutlery Company
1844 Lansdowne Avenue
Merrick, New York 11566

Re: U. S. Patent No. 3,293,405

Dear Sir:

I am writing this letter on the behalf of my client who has recently been issued U. S. Letters Patent No. 3,293,405 for an electrically heated sock.

This patent covers an electrically heated sock which is energized by a single flashlight battery carried in a pocket adjacent the hem portion of the sock. The advantages of the patented construction are that long lengths of wire are eliminated and the heater in the toe portion of the sock is able to be energized by a low-voltage battery which may be either a standard flashlight battery, an alkaline battery, a nickel cadmium battery or a rechargeable battery. Prior to this invention no other known electrically heated sock was capable of operating on such low-voltage batteries.

This construction is completely unique to my client as is evident by the grant of the above-identified U. S. Letters Patent. For your convenience a copy of this patent is enclosed.

To date there has only been one authorized licensee of this patent and such licensee is currently manufacturing and distributing this patented sock construction under the trademark LECTRA-SOX. This electric sock has proved to be commercially successful and it constitutes the only patented sock of its kind in commerce.

ONLY COPY AVAILABLE

It has recently come to my client's attention that your company has been offering for sale an electric sock. I am, therefore, inquiring on the behalf of my client as to whether or not you will advise me at this time from whom your company is purchasing the electric socks being offered. Inquiry is being made at this time for the reason that if such socks are not purchased from an authorized licensee then the unauthorized sale and/or use thereof may be considered an infringement of the above-identified patent.

It is, therefore, suggested that unless you purchase your electric sock from an authorized licensee that you consult your attorney before making, using, or selling socks manufactured by and/or supplied by others than an authorized licensee.

Please be advised that I have been authorized to vigorously enforce my client's patent rights. Therefore, if you have any regard for the patent rights of others, I am sure you will not knowingly infringe the same by selling any socks which do not originate from an authorized licensee.

I trust that you will therefore utilize your best discretion with respect to this matter and that you will immediately advise me from whom you have secured the electric socks which are being offered by you for sale.

Very truly yours,

Arthur T. Fattibene

Enclosure

ATF:smb

OFFICES OF
ARTHUR T. FATTIBENE
PATENT ATTORNEY
655 MADISON AVENUE
NEW YORK, NEW YORK 10021
(212) 688-7200

BRIDGEPORT, CONN. 06603
137 ELM STREET
TEL. 335-6224 (CODE 203)
259-0033
WASHINGTON, D. C.
711 FOURTEENTH STREET, N. W.

U. S. AND FOREIGN
PATENTS, TRADEMARKS
AND COPYRIGHTS

November 2, 1967

Mr. E. A. Piller, President
Alexander Sales Corporation
125 Marbledale Road
Tuckahoe, New York 10707

Re: Timely Products et al. v. Visa-Therm et al.

Dear Mr. Piller:

In accordance with our conversation I am enclosing a copy of the Costanzo patent no. 3,293,405 granted December 20, 1966 which is directed to an electrically heated sock.

As you are now aware of my client's action against Visa-Therm and Stanley Arron for patent infringement of the enclosed patent and for claims of unfair competition and appropriation of my client's invention, it is strongly urged that you seek the advice of your own counsel before further considering the sale of electric socks which are considered to constitute a violation of the enclosed patent.

As it was brought out at your deposition on October 27, 1967, the law with regard to infringement is quite clear, and that Section 271 of the Patent Laws 35 U.S.C. expressly states:

> "(a) Except as provided in this article, whoever without authority makes, uses, or sells any patented invention within the United States during the term of the patent therefor infringes the patent.
>
> (b) Whoever actively induces infringement of a patent shall be liable as an infringer."

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Therefore, if you have any regard for the patent rights of others, I am sure that you will not knowingly infringe the same. Because it is my belief that you are unnecessarily exposing yourself to liability by continuing to sell and/or offer for sale electric socks manufactured by Visa-Therm, it is strongly urged that you consult your own attorney with regard to the matter before subjecting yourself to further exposure. I would also strongly recommend that you have your attorney get in touch with me so that we can have a first-hand discussion with regard to this matter.

I am sure that you can appreciate the need and urgency of clarifying the respective positions of yourself and my client.

Very truly yours,

Arthur T. Fattibene

ATF:smb

Enclosure

NN12

HH12

November 6, 1967

M. Shaaf & Co., Inc.
200 McGrath Highway
Somerville, Massachusetts 02143

Re: U. S. Patent No. 3,293,403

Attention: Mr. Fred Shaaf

Dear Mr. Shaaf:

I am writing [illegible] recently been issued U. S. Patent No. 3,[illegible] as electrically heated [illegible]

In the event that you are not aware of this patent, [illegible] enclosed herewith a [illegible] in accordance by a double [illegible] adjacent the rim of the [illegible] corresponding one end of [illegible] which the heated air issues [illegible] In accordance with [illegible] a very [illegible]

Since my client [illegible] was capable of [illegible] to completely [illegible] of the above-identified [illegible] enclosure a copy of this patent [illegible]

It has recently come to our attention that your company [illegible] offering for sale and/or selling electrically heated [illegible] way be in conflict with the above-identified patent. [illegible] advised that the U. S. Patent Laws, 35 U.S.C., Section [illegible] expressly state:

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"Whoever without authority makes, uses or sells any patented invention within the United States during the term of the patent therefor infringes the patent, and that whoever actively induces infringement of a patent shall be liable as an infringer."

Therefore, if you have any regard for the patent rights of others, I am sure that you will not knowingly want to infringe this patent.

It is my opinion that if you continue to sell electric socks manufactured by an unauthorized company or firm you are unnecessarily exposing yourselves to liability. For this reason, it is strongly urged that you consult your own attorney with regard to the matter of selling electric socks manufactured by someone other than an authorized manufacturer before you subject yourselves to any liability.

I would also strongly recommend that you have your attorney get in touch with me so that we can have a first-hand discussion with regard to this matter.

I am sure you can appreciate the need and the urgency of clarifying the respective positions of yourselves and my client.

Very truly yours,

Arthur T. Pattiberio

ATP:smb

Enclosure

NNN6

NN13

OFFICES OF
ARTHUR T. FATTIBENE
PATENT ATTORNEY
655 MADISON AVENUE
NEW YORK, NEW YORK 10021
(212) 688-7200

BRIDGEPORT, CONN. 06603
137 ELM STREET
TEL. 335-6224
259-0033 (CODE 203)
WASHINGTON, D. C.
711 FOURTEENTH STREET, N. W.

U. S. AND FOREIGN
PATENTS, TRADEMARKS
AND COPYRIGHTS

November 16, 1967

Hygrade Cutlery Company
1844 Lansdowne Avenue
Merrick, New York 11566

Re: U. S. Patent No. 3,293,405

Attention: President

Dear Sir:

This is to supplement my letter of November 2, 1967 inquiring from whom you secure the electric socks which are being offered by you for sale.

Please be advised that unless you are purchasing the electric socks which you are offering for sale from an authorized licensee you may be exposing yourselves to liability for patent infringement. U. S. Patent Laws 35 U.S.C. Section 271 expressly states:

> "(a) Except as provided in this article, whoever without authority makes, uses or sells any patented invention within the United States during the term of the patent therefor infringes the patent.
>
> "(b) Whoever actively induces infringement of a patent shall be liable as an infringer."

Therefore, if you have any regard for the patent rights of others I am sure that you will not knowingly want to infringe U. S. Letters Patent No. 3,293,405, a copy of which was enclosed in my letter of November 2, 1967. Therefore, unless you advise me from whom you secure the electric socks which your company is selling it will be assumed that you are handling the product of an unauthorized licensee.

In the event that you are securing your electric socks from an unauthorized source, it is strongly urged that you then consult your attorney with regard to your sale of such electric socks before subjecting yourselves to possible liability for patent infringement.

Trusting to hear from you soon with respect to this matter, I remain

Sincerely yours,

Arthur T. Fattibene

Arthur T. Fattibene

ATF:smb

NNY
NNC

March 11, 1967

Visa-Therm Products, Inc.
c/o Mr. Stanley Aaron
3323 Old Town Road
Bridgeport, Connecticut

Re: Patent Infringement of U. S. Letters Patent 3,293,405
for Electrically Heated Footwear

Dear Stanley:

I am writing this letter on the behalf of Ray Costanzo and Timely Products Corporation to notify you that the manufacture and sale of your battery-heated electric sock constitutes an infringement of the above-identified patent.

As you know the granting of a patent gives to the patentee the right to exclude all others from making, using or selling subject matter covered by such patent. A study of the construction of the sock being manufactured and distributed by or for you is considered to be an infringement of the above-identified patent. Therefore, in the absence of any license or agreement, it is requested that you cease and desist from further manufacture, use and/or sale of any electrically heated socks which come within the scope of the claims of the above-identified patent.

Unless you discontinue the manufacture and sale of the infringing item and unless you make an accounting of all socks manufactured and sold since the issue date of the patent, I have been authorized to institute the necessary proceedings to enforce the rights of my clients with respect to this patent.

Trusting to hear from you soon with respect to this matter, I remain

Sincerely yours,

ATT:mab

Arthur T. Pattibone

194

RECEIPT FOR CERTIFIED MAIL—20¢

No. 631101

Sent to: Patricia Sulzycki

POSTMARK OR DATE

STREET AND NO. 349 Noble Ave

CITY AND STATE Bridgeport, Conn.

If you want a return receipt check which ☒ 10¢ shows to whom and when delivered ☐ 35¢ shows to whom, when, and address where delivered

If you want restricted delivery, check here ☐ 50¢ fee

FEES ADDITIONAL TO 20¢ FEE

POD Form 3800 Dec. 1960

CAUTION—NOT FOR INTERNATIONAL MAIL (See other side)

NN13
NN15

Miss Patricia Sulzycki
349 Noble Avenue
Bridgeport, Connecticut

Re: Infringement of U. S. Letters Patent No. 3,293,405

Dear Miss Sulzycki:

This is to advise you that I represent Ray Costanzo and Timely Products Corporation and that I have been advised to inform you that your company, Visa-Tharm Products, Inc., is manufacturing and/or is having manufactured for it and selling battery-operated electrically heated socks which infringe the above-identified U. S. patent.

It is, therefore, requested that you and your company cease and desist from the further manufacture, use and/or sale of the electrically heated socks which infringe the above-identified patent, and further that you and your company render an accounting of all socks manufactured and sold since the issue date of the patent, and that restitution for past infringements be made. Unless you and your company can assure my clients in writing that all further acts of infringement of the above-identified patent will cease, I have been authorized to pursue the necessary legal remedies to enforce the above-identified patent.

I trust that you will give this matter your prompt attention and that my clients can expect to hear from you in the very near future with regard to this matter.

Very truly yours,

Arthur D. Patchbase

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Dk-227

Family Boat Sales.

1966	19,000 yrs.
1967	97,600 yrs.
1968	110,100 yrs.
1969	108,300 yrs.
1970	110,400 yrs.

Information received from Family.

OBJ.

Kenai relayed this time.

121D 228
1
not listed in Exh. List

Seneca Knitting Mills Co., Inc.

Red Jacket HOSIERY Red Top SPORTSMEN'S SOCKS

Seneca Falls, N.Y. 13148

TELEPHONE: 315-568-8441

FRANCIS J. SOUHAN
PRESIDENT
GEORGE G. SOUHAN
EXECUTIVE VICE PRESIDENT

NEW YORK OFFICE
450 7TH AVE.
LA 4-9026

January 13, 1966

New York City

Mr. Arthur F. Fattibene
485 Lexington Avenue
Suite 2610
New York, New York

Dear Mr. Fattibene:

I am enclosing a copy of the brochure we mailed to a number of sporting goods wholesalers last fall. This is the mailing that I mentioned created an interesting number of responses, but against which we have not shipped any sample heat socks whatsoever. I thought this might be of interest to you, if you do not already have one.

In a few days I should receive the mills latest attempt at making a so called heat sock. The one I have in the office is a pilot model and it does not have what I would call a satisfactory appearance. I would like very much to show this to Timely Products with the hope that we could work something out to our mutual advantage.

During our conversation, you mentioned the word novelty and we have recently been interested in a novelty type hose. Incidentally, this has nothing to do with a heat sock at all. I hope to have some preliminary samples of this item ready by the time I see you and perhaps you will be able to do something for us on this sock. I look forward to our visit and with kindest personel regards, I remain,

Sincerely,

SENECA KNITTING MILLS CO., INC.

Jack Watkins

John C. Watkins
Vice President - Sales

JCW:ml
Encl.

UX-LL4
229

LLY ARRON 3323 OLD TOWN ROAD BRIDGEPORT, CONN 372-5173

January 19,1966

hur Fattibene, Esq
ent Attorney
Lexington Avenue
York,N.Y.

RE- Timely Products and Seneca Knitting Mills Co.

r Arthur:

n I was in New York City yesterday, Jack Watkins of Seneca Knitting ls, mentioned your telling him that I had no right to license them to a Heated Sock. Please be assured that I had the right to do so.

other statements you have made indicate that you are not up to date ll developements in the field of Heated Socks. The sock you are corned with is one that was rejected by the J.C. Penny Company for ral reasons, the most important of which is washability. Adequate stigation on your part will confirm that,the sock being made by eca is a different product,that represents a solution to many problems ront in your client's product.

Heated Sock being made by Seneca is covered by a Patent Application d quite a long time ago;and it's conception and development progress carefully dated,tested and witnessed by outside sources. Competent nt Attorneys searched the Arts, considered every known developement, re of the opinion that it is patentable, without infringing on any nt existing,or Pending.

dentally, the majority of the items removed from my office were rned the day after I called you. Thank you for your co-operation.

Sincerely Yours

os- Jack Watkins
Timely Products

z

Stanley Arron

May I suggest that "if" and "when" your client receives receives a Patent in a few years and there should be an infringement you will have a basis for some action. These people are polite and will listen to what you have to say but will not , in the end, be swayed by badgering and intimidation.

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Feb. 26, 1963 P. WINCHELL 3,079,486

ELECTRICAL HEATER FOR A CONTAINER

Filed May 22, 1961 2 Sheets-Sheet 2

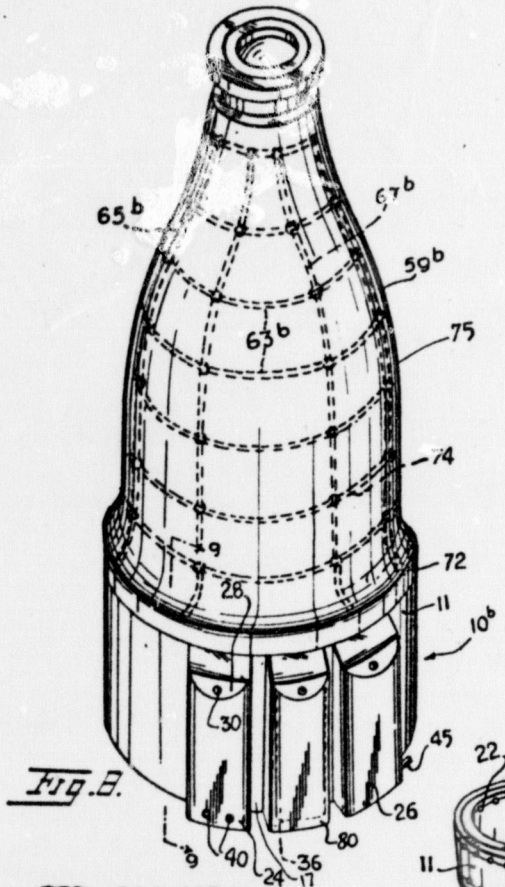


Fig. 8.

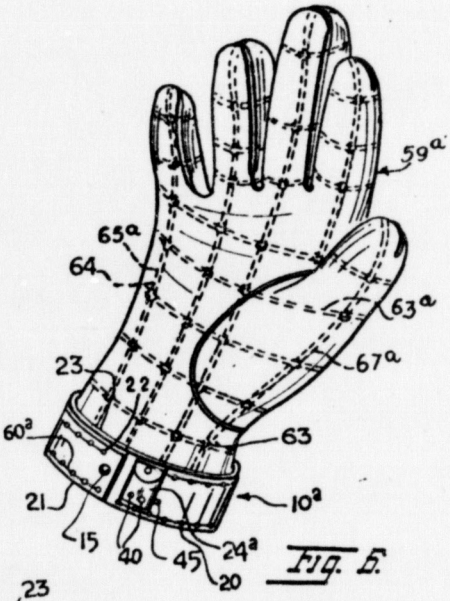


Fig. 6.

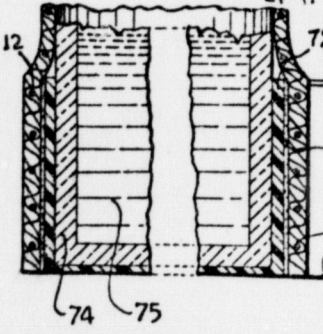


Fig. 9.

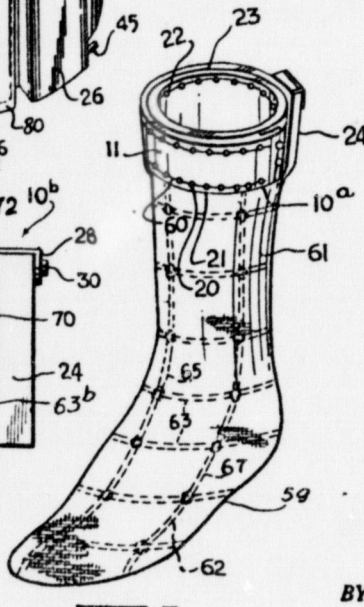


Fig. 5.

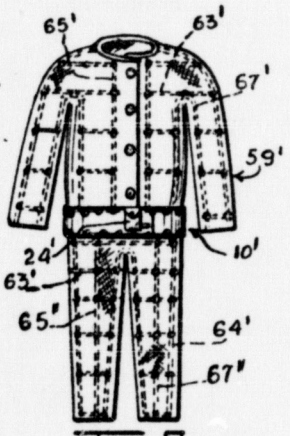


Fig. 7.

INVENTOR.
PAUL WINCHELL
BY
ATTORNEY

United States Patent Office 3,079,486 Patented Feb. 26, 1963

3,079,486

ELECTRICAL HEATER FOR A CONTAINER

Paul Winchell, 9—05 166th St., Whitestone, N.Y.

Filed May 22, 1961, Ser. No. 111,658
2 Claims. (Cl. 219—46)

This invention relates generally to heaters and more particularly to a portable heater for heating articles of clothing, containers, and sundry articles individually.

According to one form of the invention, an enclosure member shaped substantially the same as the article to be heated carries an electric battery and is adapted to be heated by the battery and placed in snug engagement around the article for heating the article by radiation. The enclosure member is readily placed on and removed from the article to be heated.

A principal object of the present invention is to provide a self-contained heater device shaped so as to be placed over the article to be heated, and embodying all of the heating elements necessary to heat the article.

Another object is to provide a heater for individually heating articles of clothing. containers of food and the like and other articles when the house supply of electricity is not available or convenient.

The invention is especially adapted for heating articles of clothing such as socks, mittens, gloves, shoes, underwear, hats, caps, ear muffs, and the like; and also for heating containers such as bottles, lunch boxes and the like in order to keep the contents thereof heated; and for keeping bread, rolls and the like in containers in heated condition.

The invention contemplates according to a modification to provide a heater with an electric battery having means for recharging the same.

A further object of the invention is to provide a heater device adapted to heat sundry articles individually that is efficient for the purposes intended.

For further comprehension of the invention and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

FIG. 1 is a front perspective view of a heater device embodying one form of my invention, a plug device for recharging the batteries being shown in position ready to be attached to the battery, parts being shown broken away.

FIG. 2 is a top plan view thereof in flattened out condition, parts being broken away.

FIG. 3 is a vertical sectional view taken on the line 3—3 of FIG. 2.

FIG. 4 is a vertical sectional view taken on the line 4—4 of FIG. 2.

FIG. 5 is a front perspective view of a heater device embodying a modified form of the invention in operative position on a sock.

FIG. 6 is a front perspective view of a heater device embodying a further modified form of the invention in operative position on a glove.

FIG. 7 is a front perspective view of still another modified form of the invention in operative position on pajamas.

FIG. 8 is a front perspective view of yet another modified form of the invention in operative position on a bottle.

FIG. 9 is a vertical sectional view taken on the line 9—9 of FIG. 8, parts being shown broken away.

FIG. 10 is a diagrammatic view showing the electric circuit.

Referring to FIGS. 1–3, there is shown a heating device or apparatus 10 including a band 11 of suitable fabric material, such as blanket material and the like in which is embedded a plurality of resistance heating wires 12. The wires are insulated from each other by the dielectric material of the body of the band. At one end 14 of the band there are snap fastener members 15 adapted to adjustably engage mating fasteners 16 disposed on the other end 18 of the band. Holes, 20, 22 are provided along opposite edges 21, 23 of the band for receiving sewing thread or other fastening means to attach the band to an article to be warmed by the device.

Integrally formed with the band 11 are one or more pockets 24, 26 provided with integral closure flaps 28. The flaps have snap fasteners 30 engageable with fastener elements 32 integrally formed in outer sides of the pockets. An electric battery 36 is disposed in each pocket. In one pocket there is a rectifier assembly 38 having a receptacle 40 with openings for receiving the prongs 41 of a plug of a power cord 43 of a plug 45 which may be connected to a power supply for recharging the batteries. A switch 44 may be disposed in pocket 26. If necessary, all electrical components can be disposed in a single pocket along with the battery. Alternatively, more than two batteries may be disposed in a single pocket or more than two pockets may be provided. The pockets are connected by a web 17. Switch button 44 protrudes from pocket 26 for turning the batteries on and off.

In FIG. 10 there is shown the electrical circuit of the device. It will be noted that resistance elements 12 are connected in parallel to terminals of the serially connected batteries 36 by conductors 13 and 19 tapped off the elements 12. Switch 44 is preferably a double-pole double-throw switch with one stationary contact 49 adapted to be closed by movable contact 50 when movable contact 51 is open with respect to stationary contact 52 and vice versa. Rectifiers 54 are connected in series with contact 52 and with one terminal 40^a of the receptacle 40. The other terminal 40^b of the receptacle is connected to terminal 56 of the batteries. Both movable contacts 50, 51 are connected to terminal 57 of the batteries.

FIG. 10 shows the battery circuit closed for energizing the resistance wires 12. When the switch 44 is thrown to its open position by actuating switch button 47, the power supply circuit of wires 12 is open and the battery recharging circuit via movable contact 51 and contact 52 is closed to receive energy from the plug 45.

FIG. 5 shows a modified form of heater device 10^a having a single battery in pocket 24^a forming one end of an enclosure member 59 adapted to fit over a sock 62 and secured to the ankle portion 61 of the sock by stitching 60. The body of the enclosure member 59 has transverse heating wires 63 embedded therein. The wires 63 are in electrical contact with a conductor 65 leading from the positive side of the battery in pocket 24^a and with a conductor 67 connected to the negative side. The entire sock is accordingly heated.

In FIG. 6 the device 10^a is secured to one end of an enclosure member 59^a shown enclosing a glove 64, and is secured to the wrist 63 of the glove by stitching 60^a. The enclosure member supports cross heating wires 63^a connected to conductors 65^a and 67^a connected to the positive and negative sides of the battery 24^a.

FIG. 7 illustrates the device 10′ secured to the middle on a one-piece closure member 59′ shown enclosing an article of underwear such as pajamas 64′. The upper portion of the pajamas support cross heating wires 63′ connected to the positive and negative sides of the battery 24′ by conductors 65′ and 67′ and the lower cross heating wires 63′ are connected to the positive and negative sides of the battery by conductors 65″ and 67″.

In FIGS. 8 and 9, the device 10^b is shown secured to one end of a cover body 59^b for heating a bottle 74. In

this form of the invention, the device 10b is attached by a cement layer 70 to a cup 72. The bottle containing milk 75 or the like is placed in the cup. The cover body is provided with cross heating wires 63b which are connected to the positive and negative sides of the batteries 24, 26 and 80 which are connected in series by conductors 65b and 67b, respectively and controlled by switch button 45.

Alternatively, the cup 72 may be provided with a cover and used as a lunch box. Numerous other applications of the invention will readily occur to users thereof. The invention may be of especial utility to uniformed personnel such as policemen, soldiers, workers in the refrigeration warehouses, persons in frigid climates etc. The invention is particularly directed at a heating device which is comparatively light in weight and portable. It employs batteries which are conveniently and inexpensively rechargeable when required.

While I have illustrated and described the preferred embodiments of my inventions, it is to be understood that I do not limit myself to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A heater for a container in the form of a bottle, said heater comprising a cup for receiving the bottom of a bottle, an elongated fabric cover body shaped to conform to the shape of a cylindrical bottle, an annular band connected to the periphery of the cup, an electric battery supported by said band, heating wires embedded in the cover body and band and extending thereacross, conductors extending longitudinally of the cover and connected to the battery and to the heating wires, and a switch for controlling the battery.

2. A heater for a container in the form of a bottle, said heater comprising a plastic cup open at the top to receive the bottom of a bottle, an elongated fabric cover body shaped to conform to the shape of the bottle, a fabric band secured around the cup, heating wires embedded in the cover body and band, a pocket supported on the outside of said band, a battery mounted in said pocket and means of electrical connection between the battery and heating wires, and a switch for controlling the circuit including the battery and wires.

References Cited in the file of this patent

UNITED STATES PATENTS

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P-3 DX A-2

Feb. 19, 1929. 1,702,583

I. WILLIAMS

ELECTRIC HEATER

Filed July 29, 1927

Fig. 1.

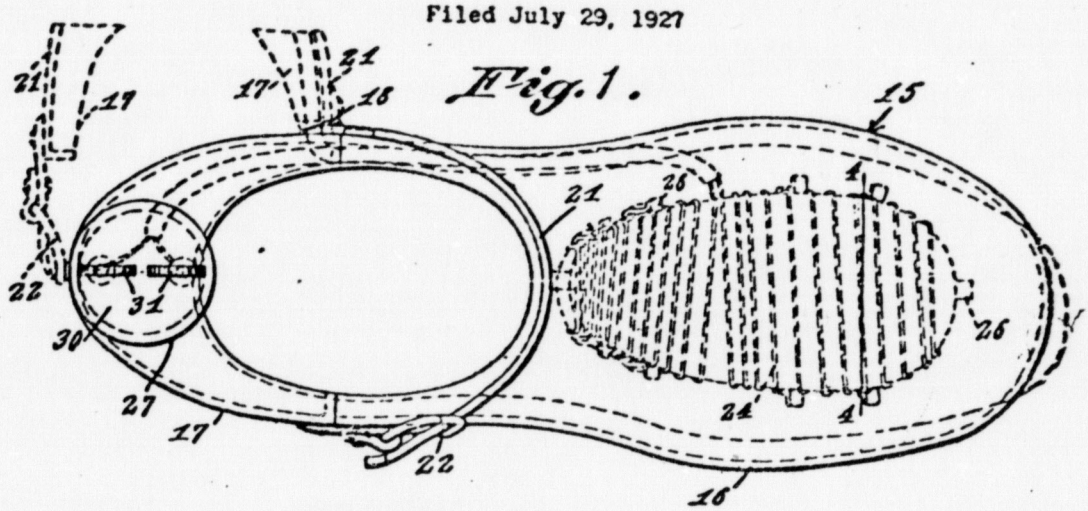


Fig. 2.

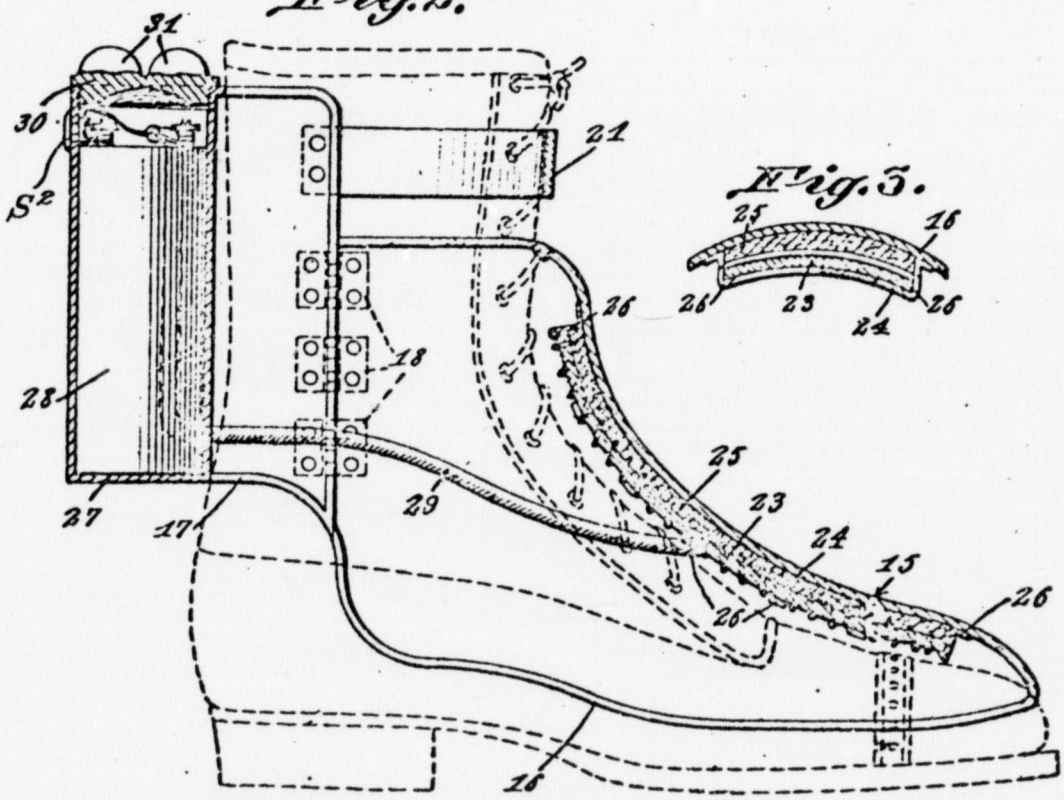
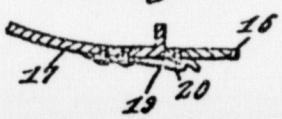


Fig. 3.

Fig. 4.



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Patented Feb. 19, 1929. 1,702,583

UNITED STATES PATENT OFFICE.

ISIAH WILLIAMS, OF GARY, INDIANA.

ELECTRIC HEATER.

Application filed July 29, 1927. Serial No. 209,324.

This invention relates to heaters for use in warming parts of the human body, an object of the invention being to provide means for keeping the feet warm, and thereby not only warming these members of the body, but by doing so, add to the warmth of the entire body.

Another object of the invention is the provision of means of the above character which may be readily secured in position for use and may be worn without discomfort.

Another object of the invention is the provision of a heater of the character stated which is simple in construction, and in which the heating element may be readily replaced.

With the above and other objects in view, the invention further includes the following novel features and details of construction, to be hereinafter more fully described, illustrated in the accompanying drawings and pointed out in the appended claim.

In the drawings:—

Figure 1 is a plan view of one of the feet warming devices.

Figure 2 is a sectional view illustrating by dotted lines the position of a shoe within the foot warmer.

Figure 3 is a section taken substantially on the line 4—4 of Figure 1.

Figure 4 is a fragmentary section showing the manner of latching the front and rear sections.

Referring to the drawings in detail wherein like characters of reference denote corresponding parts, the reference character 15 indicates generally a foot warmer or heater. This heater comprises a shell which includes a front section 16 and a back section 17, the sections being hingedly connected at adjacent edges as shown at 18. The other adjacent edges of the sections are connected by a latch 19 which is secured to one of the sections and which engages a tooth 20 carried by the other section.

The front section 16 is shaped substantially in conformity with the shape of a shoe and is adapted to fit over the top of a shoe, while the back section 17 is shaped so as to conform substantially to the shape of the back of a shoe. The back section extends upward above the upper edge of the front section and a strap 21 is adapted to extend around the shoe and have its opposite ends connected to the edges of the back section. One edge of the back section carries a buckle 22 to provide connecting means for the free end of the strap.

Located within the front section and adapted to extend upward along the front of the shoe from the toe of the latter is a heating element. This heating element may be of a suitable type, the element shown comprising an isinglass core 23 around which is coiled a resistance wire 24. An asbestos or other insulating member 25 is positioned between the resistance element and shell and the structure is removably held in place by means of attaching elements 26 located at each end of the heating element.

The back section 17 carries a holder or pocket 27 within which is positioned an electric cell 28 which provides a source of current for the heating element, connection being effected by means of a conductor cord 29. The holder or pocket 27 is closed by a plug 30 which is threadedly secured in place and which is provided with ears or finger pieces 31.

A switch S^1, arranged upon the battery holder controls the supply of current to the heating element.

The invention is susceptible of various changes in its form, proportions and minor details of construction and the right is herein reserved to make such changes as properly fall within the scope of the appended claim.

Having described the invention, what is claimed is:—

An electric heater comprising a shield shaped substantially in conformity with the shape of a shoe and comprising a front section and a back section, means connecting one edge of the front section with one edge of the back section to permit of relative movement of said sections, means detachably connecting opposite edges of the front and back sections, an electric heating element carried within the front section, a source of current carried by the back section and means electrically connecting the heating element and source of current.

In testimony whereof I affix my signature.

ISIAH WILLIAMS.

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C1F
C.2H

Oct. 13, 1964 R. G. THEODORE ETAL 3,153,140

RADIANT HEATING PANEL

Filed Sept. 12, 1961

Fig. 1.

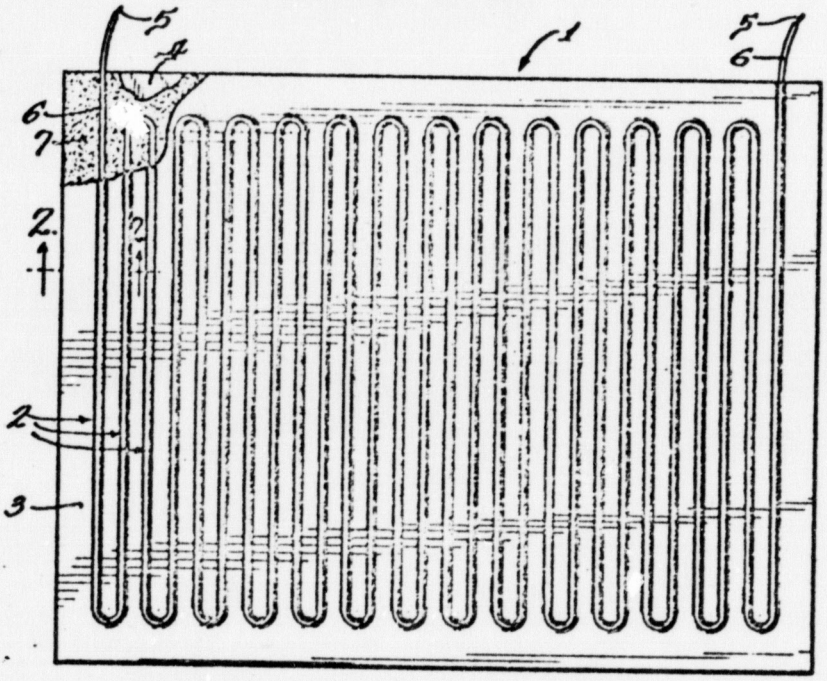


Fig. 2.

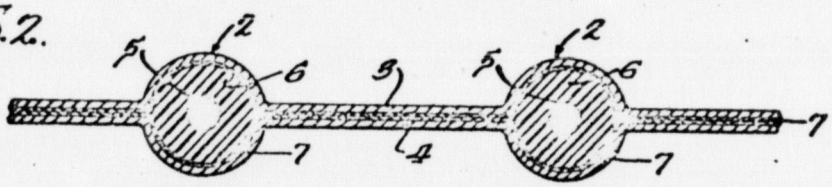


Fig. 3.

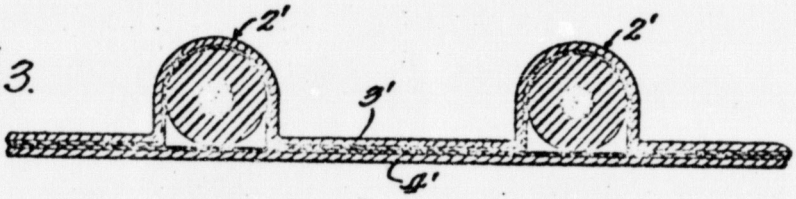
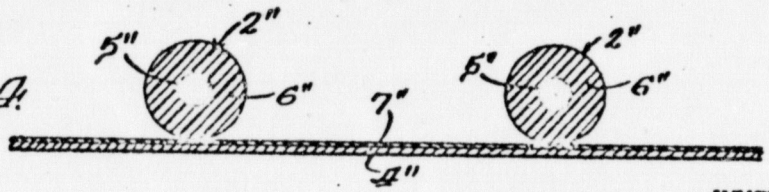


Fig. 4.



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204

United States Patent Office

3,153,140

Patented Oct. 13, 1964

3,153,140

RADIANT HEATING PANEL

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Filed Sept. 12, 1961, Ser. No. 137,559

2 Claims. (Cl. 219—549)

This invention relates to improvements in a radiant heating panel or sheet which essentially is constructed of an insulated electric resistance wire heat sealed to one or between two carrier sheets or foils.

The application is a continuation-in-part of our co-pending application Serial No. 815,346, filed May 25, 1959, and now Patent No. 3,010,007.

One of the important features of the invention resides in a radiant heating panel or sheet which is extremely flexible permitting use where more resilient and bulky panels cannot be used.

Another important feature of the invention resides in a radiant heating panel or sheet which may be manufactured economically and yet the structure is sturdy and safe to use.

A further important feature of the invention resides in a radiant heating panel wherein the radiant panel members comprise flexible sheet film or foil having an inner face comprising a heat-responsive plastic and a resistance wire having a flexible insulating sheath comprising the same or a complementary heat-responsive plastic, and wherein the wire is intimately and firmly, yet simply and economically, bonded to the sheet by fusing the plastic materials.

Other objects, advantages and features of the present invention will be more apparent from the accompanying drawing and following detailed description.

In the drawing:

FIG. 1 is a face view of a radiant heating panel or sheet embodying the features of the present invention;

FIG. 2 is an enlarged detailed sectional view taken on line 2—2 of FIG. 1, certain parts being exaggerated in size;

FIG. 3 is a sectional view similar to FIG. 2 showing a modification; and

FIG. 4 is a sectional view of a further modification.

Referring in detail to the drawing, 1 indicates generally a radiant heating panel or sheet embodying the features of the present invention. The panel 1 comprises essentially a heating unit 2 bonded to a flexible carrier sheet, or sandwiched between two such sheets 3 and 4.

The heating unit 2 comprises conventional resistance wire 5 sheathed by an insulating material 6. The insulating material comprises a flexible material, preferably polyvinyl chloride or similar plastic material or mixture which will withstand temperatures up to about 220° F. without melting or distintegrating. The heating unit is arranged in a zigzag or serpentine fashion conventional in the arrangements used in heating panels, electric blankets, electric sheets or the like so that the pattern employed will produce heat over a relatively large area.

Whether the carrier is comprised of two sheets, as shown in FIGS. 1 to 3, or one sheet, as shown in FIG. 4, each comprises a thin flexible sheet, film or foil having at least one face comprising a heat-responsive plastic material. The preferred sheet is metal foil having a thin plastic coating on one face. Other materials include plastic-coated paper, cardboard and cloth and plastic films per se. The foil used is preferably aluminum foil having highly efficient radiant energy-reflecting surfaces. Preferably the foil thickness or caliper is less than about three-thousandths of an inch. Of course, heavier foil may conceivably be used so long as the foil sheets are

reasonably flexible and do not, when used in pairs, appreciably bridge adjacent wires of the heating unit when said wires are sandwiched between the radiant sheets, as will be hereinafter more fully described.

In FIGS. 1 and 2, the heating unit wires 2 are sandwiched between the two opposite sheets 3 and 4. As a feature of the present invention, the inner or confronting faces of the sheets 3 and 4 comprise (as with plastic films), or are coated with a relatively thin coating 7 of, a heat-responsive plastic adhesive, preferably polyvinyl chloride or similar plastic material complementary to the insulating sheath on the wire, the coating 7 in FIG. 2 being shown in exaggerated thickness.

Thereafter a heated member, such as a heated roll, iron or plate (not shown) is rolled or passed over or pressed against each side of the composite sheet or panel and the coated faces of the sheets 3 and 4 are secured together and secured to the surface of the insulation 6. By virtue of the flexible character of the foil sheets, the sheets may be brought into intimate contact with each other and with the major portion of the outer surface area of the insulation 6. That is, no appreciable bridging of the sheets 3 and 4 will take place between adjacent wires or conductors of the heating unit.

The preferred manner of sandwiching the heating unit between the sheets 3 and 4 is illustrated in FIG. 2 wherein the sheets 3 and 4 symmetrically sandwich the wires of the heating unit. However, if desired, the sheets may sandwich the heating unit wires as shown in FIG. 3, wherein sheet 4' is maintained substantially flat and sheet 3' is distorted to embrace the heating unit conductors 2'. For automatic or machine securement of the sheets together about the heating unit, one manner of securement may be preferred over the other. In either case, however, a minimum of bridging of the sheets over the conductors will occur.

Due to the compatibility of the heat-responsive plastics comprising the coatings 7 and the insulation 6, the two sheets 3 and 4 are intimately bonded to the portions of the insulation 6 contacted thereby and the contacted facial portions of the sheets are similarly bonded together positively to unite the components and secure the coil of wire.

In FIG. 4 embodiment of the invention, the intimacy and permanency of the bond acquired under heat between the carrier and the flat coil of wire is utilized to maximum advantage to provide an exceptionally economical radiant heating panel. As shown, this panel consists simply of the flat coil of insulated wire 2" and a substantially flat single carrier sheet 4" to which the wire is heat bonded. The sheet 4", as previously described, may comprise a plastic-coated metal foil, plastic-coated paper, cardboard or cloth, or a film of the selected plastic, such as a thin polyvinyl chloride. While reference is made to polyvinyl chloride, it is appreciated that other materials may be employed and that the materials need not be the same, so long as they are complementary to one another. As used hereinafter, "complementary" is intended to include both the same material and other complementary materials.

To produce the panel of FIG. 4, a flat sinuous coil of the wire 2" is laid out on a table or the like, a carrier sheet 4" is laid on top of the coil with its coated or plastic face abutting the coil, and a heated member, such as a roller, iron or plate is pressed against or passed over the exposed upper face of the carrier to heat the face or coating 7 and the contacted portion of the sheath 6 to cause the two to fuse and be intimately bonded together. A suitable heat range is about 300–375° F. depending on the materials employed and the duration of heat application.

The result, in all of the disclosed embodiments, is an extremely flexible and exceptionally economical radiant

heating panel of rugged construction capable of long service life. The bond effected between the plastic materials will readily survive for prolonged periods of use the normal range of panel heats.

Other obvious variations of the invention, which do not depart from the spirit of the invention, will occur to anyone skilled in the art and, hence, it is not intended that the invention be limited to the exact details shown and described except as necessitated by the appended claims.

What is claimed is:

1. A radiant heating panel comprising a flat sinuous coil of resistance wire having an insulating sheath of relatively flexible heat responsive plastic insulating material, and a foil-like carrier sheet disposed on one side only of said coil, said sheet having on the face thereof confronting said coil a coating of heat responsive plastic material complementary to the material of said sheath, said coil and said sheet being adhered together by a heat-sealed adhesive bond between said sheath and the confronting face of said sheet.

2. A radiant heating panel comprising a flat sinuous coil of resistance wire having an insulating sheath of relatively flexible heat responsive plastic insulating material, and a foil-like carrier sheet disposed on one side only of said coil, said sheet having on the face thereof confronting said coil a coating of heat responsive plastic material complementary to the material of said sheath, said coil and said sheet being adhered together by a heat-sealed adhesive bond between said sheath and the confronting face of said sheet, said sheet being selected from the group consisting of a film of plastic material complementary to the material of said sheath, and plastic coated metal foil, paper, cardboard and cloth.

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DX-A-10

DX-CIE

April 2, 1963

G. C. CARRONA

3,084,241

ELECTRICALLY HEATED GARMENT

Filed Feb. 8, 1961

2 Sheets-Sheet 1

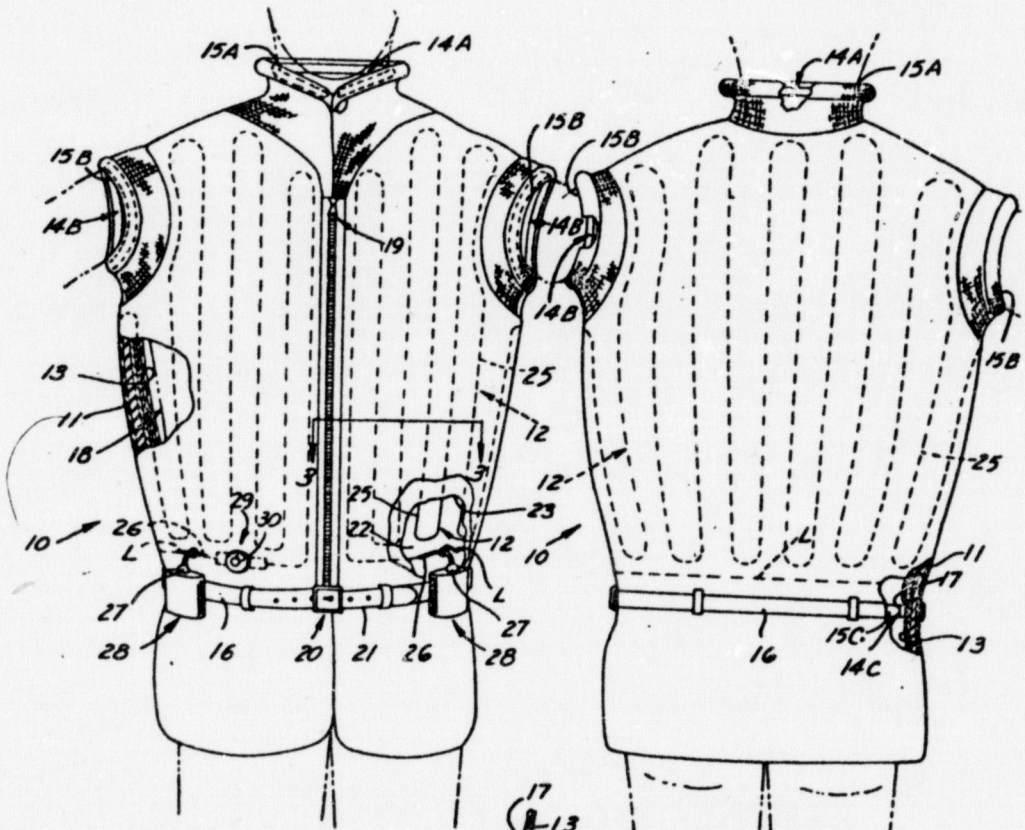


FIG. 1

FIG. 2



FIG. 4

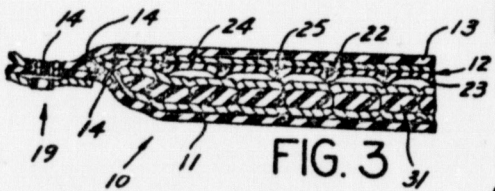


FIG. 3

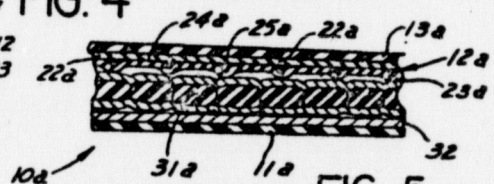


FIG. 5

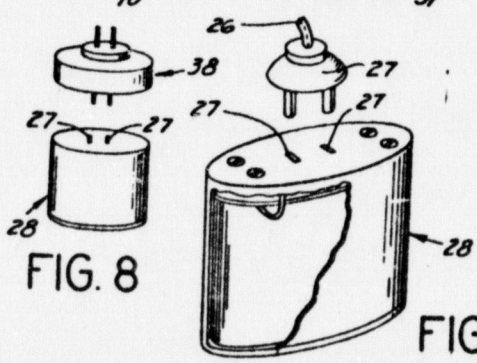


FIG. 8

FIG. 6

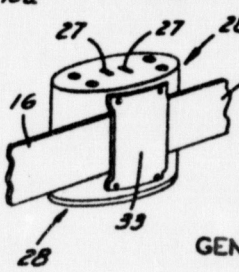


FIG. 7

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ELECTRICALLY HEATED GARMENT

Filed Feb. 8, 1961 2 Sheets-Sheet 2

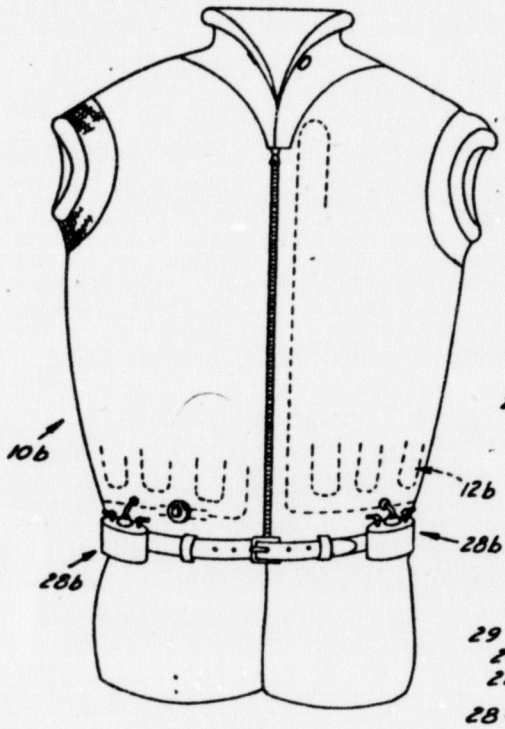


FIG. 10

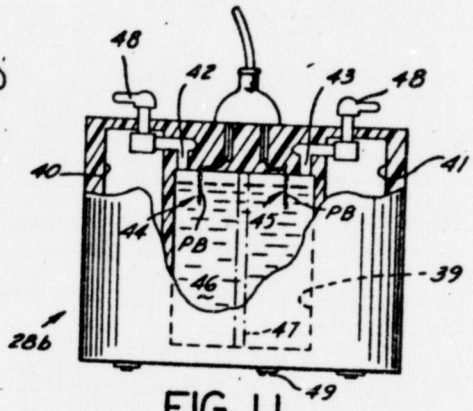


FIG. 11

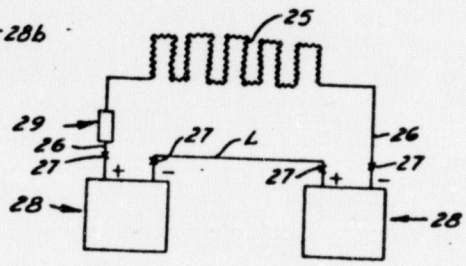


FIG. 9

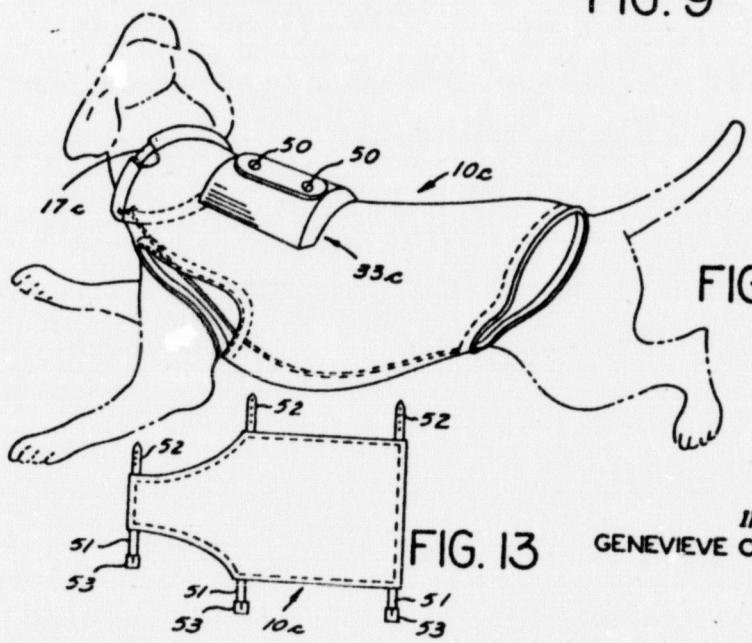


FIG. 12

FIG. 13

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3,084,241

Patented Apr. 2, 1963

3,084,241

ELECTRICALLY HEATED GARMENT

Genevieve C. Carrona, 2316 Calle Chiquita, La Jolla, Calif.

Filed Feb. 8, 1961, Ser. No. 87,932
15 Claims. (Cl. 219—46)

The present invention comprises an electrically heated garment including an electrically heated torso or trunk covering or enclosing means adapted to be fastened around at least a portion of a torso of a trunk of a human or animal and provided adjacent the inside thereof with electrically energizable heat-producing means extending over a substantial portion of the area thereof whereby to effectively heat the enclosed region immediately around the torso or trunk of the human or animal. In one preferred form of the invention the torso or trunk covering or enclosing means also includes an outer insulating member adapted to minimize heat loss from the region around the torso or trunk of the human or animal whereby to minimize the heating required by the heat-producing means in order to maintain a predetermined minimum temperature immediately around the enclosed or covered portion of the torso or trunk of the human or animal.

It should also be noted that, in one specific preferred form of the invention, the heat-producing means is provided with controllably adjustable thermostatic switch means positioned within the torso or trunk covering or enclosing means and electrically connected in circuit with an electric power supply means and the heat-producing means for controllably de-energizing said heat-producing means at a predetermined or controllably adjustable upper control temperature and for energizing said heat-producing means at a predetermined or controllably adjustable lower control temperature whereby to maintain the temperature within the torso or trunk covering and enclosing means around the torso or trunk portion of the human or animal within a predetermined or controllably adjustable minimum-to-maximum temperature range.

It should also be noted that, in one specific preferred form of the invention, the other flexible insulating member is provided on either the inner or outer side thereof, or effectively therein, with inwardly directed heat-reflecting means and/or other thermal insulation means having a low heat transmission characteristic.

It should also be noted that, in one specific form of the invention, the torso or trunk covering and enclosing means additionally includes an inner thin-sheet liner means positioned immediately inside of the heat-producing means and being substantially co-extensive with the outer insulating member and being joined thereto at suitable locations such as along edge portions thereof, or the like.

It should also be noted that, in one specific preferred form of the invention, the torso or trunk covering and enclosing means is provided with sealing edge portions or means defining exit apertures for extended torso or trunk portions of the body of a human or animal passing therethrough and extending beyond said exit apertures; said sealing portions being adapted for sealingly engaging such extended torso or trunk portions of the human or animal body whereby to inhibit heat loss through said exit apertures from the interior of the heated torso or trunk covering or enclosing means.

It should also be noted that, in one specific preferred form of the invention, electric power supply means (which, in certain forms, comprises "fuel cell" or battery means) is provided with means for removably electrically connecting same to said heat-producing means for electrically energizing same. Said connection is normally provided

through the controllably adjustable thermostatic switch means.

In one specific form of the invention, the torso or trunk covering or enclosing means is provided with fastening means for fastening same in covering, enclosing, sealed relationship around at least a portion of a torso or trunk of a human or animal. In one specific animal blanket form of the invention, said fastening means comprises strap means provided with buckle means, various other mechanical fasteners, or the like.

In one specific form of the invention, the torso or trunk covering or enclosing means is provided with support means for removably carrying the electric power supply means. In one specific version of the heated animal blanket form of the present invention, said support means comprises pocket means preferably carried on the exterior of the torso or trunk covering or enclosing means. In another specific form of the present invention directed to a heated vest adapted to be worn by a human, said support means comprises belt means carried by the exterior of the garment and provided with attachment means for removably carrying said electric power supply means exterior of the garment.

In one specific form of the invention, the heat-producing means may comprise a flat thin-sheet base member of electrical insulating material and a similar cover member of electrical insulating material joined together and provided therebetween with heating element means comprising tortuous path, electrically resistive means provided with input means in electrically conductive relationship with said connection means for connection to said electric power supply means. In a preferred version of this form of the invention said base and cover members are preferably made of liquid-impervious material to prevent any moisture from inadvertently penetrating therethrough and possibly shorting out the electrically resistive means comprising the heat-producing means.

It is an object of the present invention to provide a novel electrically heated garment of the character referred to above which is of extremely simple, cheap, foolproof and highly effective construction such as to be conducive to widespread use of the device.

Further objects are implicit in the detailed description which follows hereinafter and will be apparent to persons skilled in the art after a careful study thereof.

For the purpose of clarifying the nature of the present invention, several exemplary embodiments are illustrated in the hereinbelow-described figures of the accompanying drawings and are described in detail hereinafter.

FIG. 1 is a front elevational view of one exemplary form of the present invention comprising a heated vest for cooperation with the torso of a person's body (shown fragmentarily in broken lines). Certain portions of the device are shown partially broken away in order to impart a better understanding of certain structural features of the invention.

FIG. 2 is a rear elevational view of the device shown in FIG. 1, also with certain portions partially broken away for reasons of drawing clarity.

FIG. 3 is an enlarged fragmentary sectional view taken in the direction of the arrows 3—3 of FIG. 1.

FIG. 4 is an enlarged view of a part of the lower right hand, partially broken away and sectioned portion of FIG. 2 illustrating the waist-sealing means.

FIG. 5 is an enlarged fragmentary sectional view generally similar to a portion of FIG. 3, but illustrating a slightly modified form thereof including an additional, effectively inwardly directed radiant-energy-reflecting type of insulator means in addition to the insulator means of a type adapted to inhibit thermal conduction therethrough.

FIG. 6 is an enlarged perspective view (partially broken

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away and with the connection means in exploded relationship) of one of the power supply means comprising a battery, and is exemplary of both of them.

FIG. 7 is a perspective view from the rear of the power supply means shown in FIG. 6 and illustrates the mode of attachment thereof to the belt.

FIG. 8 is a fragmentary exploded view generally similar to FIG. 6, but illustrates the provision of an adaptor which effectively comprises rectifying means for interposition between the battery means and an electric outlet whereby to effectively charge the battery. Suitable voltage and/or current modification and/or control means positioned in circuit with the rectifying means may also be included in the adaptor means if desired, although not specifically shown, since such arrangements are well known in the art.

FIG. 9 is an electrical schematic drawing of a typical circuit arrangement of the power supply means, the controllably adjustable thermostatic switch means, and the heat-producing means.

FIG. 10 is a view generally similar to FIG. 1, but illustrates the arrangement with a slightly modified form of power supply means comprising "fuel cell" means.

FIG. 11 is an enlarged, partially broken away and partially sectional view illustrating one typical exemplary fuel cell means in a generally diagrammatic way, it being understood that normally such "fuel cells" are very much smaller and a number of them would be arranged in stacked, series-connected arrangement.

FIG. 12 is a perspective view illustrating a slightly modified form of the invention comprising a heated garment for an animal—in this case a dog, although not specifically so limited.

FIG. 13 is a reduced-size plan view of the type of garment shown in FIG. 12 additionally or alternatively provided with fastening means comprising multiple strap portions and buckle means.

Referring to FIGS. 1–4, 6, and 7 for exemplary purposes, one illustrative embodiment of the invention takes a typical exemplary form wherein it comprises a flexible torso or trunk covering or enclosing means, such as is indicated generally at **10**, including an outer flexible thin-sheet insulating member **11** effectively provided inwardly thereof with electrically energizable heat-producing means, indicated generally at **12**, coextensive with a substantial portion of the inside surface area of the outer insulating member **11**.

In the specific example illustrated, the garment also includes an inner flexible thin-sheet liner means **13** positioned immediately inside of said heat-producing means **12** and being substantially coextensive with said outer insulating member **11** and being joined thereto along edge portions, such as indicated at **14**, whereby to define the torso or trunk covering and enclosing means **10** forming the heated garment.

In the specific example illustrated, the torso or trunk covering and enclosing means **10** comprising the garment is provided with sealing edge portions **14A** at the neck aperture **15A**, sealing means **14B** at each of the shoulder apertures **15B**, and effective sealing means **14C** underlying the belt **16** surrounding the region of the lower waist exit aperture **15C**. Each of these sealing means is of similar construction to that shown in detail at **14C** and includes a resilient band of compressible effectively elastic material **17** adapted to resiliently engage the corresponding portion of a person's body whereby to inhibit heat loss outwardly through said apertures **15A**, **15B**, and **15C** from the interior of the heated torso or trunk cover and enclosing means **10**; said heated interior being indicated generally at **18**.

The torso or trunk covering and enclosing means **10** is provided with fastening means for fastening same in covering and in closing sealed relationship around at least a portion of a torso or trunk.

In the specific example illustrated in FIGS. 1–4, said fastening means comprising the slide mechanical fastener commonly known as a "Zipper" fastener, indicated generally at **19**, which is adapted to be slidably moved downwardly to open the two front portions of the torso or trunk covering and enclosing means **10** comprising the garment or to be slidably moved upwardly to effectively fasten same together. Also, the belt **16** is provided with a buckle **20** carried by one end of the belt and adapted to cooperate with the opposite end **21** of the belt for fastening same together in any desired relationship whereby to snugly engage the sealing means **14C** inside of the garment in the region of the belt **16** with the torso of a wearer of the garment **10**.

The heat-producing means, in the specific example illustrated in FIGS. 1–4, comprises a flat thin-sheet base member **22** of electrical insulating material and a similar cover member **23** of electrical insulating material joined together (adhesively, cohesively, or otherwise) along the junction line indicated at **24** and provided therebetween with heating element means **25** which comprises a tortuous path, electrically resistive wire or ribbon provided with input means **26** extending beyond the joined base and cover members **22** and **23** and being in electrically conductive relationship with respect to connection means **27** adapted to be controllably connected to electric power supply means, which in the specific form of the invention illustrated in FIGS. 1–4 (and shown enlarged in FIGS. 6 and 7), comprises the battery means, indicated generally at **28**, for electrically energizing the heating element means **25**.

In the specific form of the invention illustrated in FIGS. 1–4, 6 and 7, this energization is accomplished through the controllably adjustable thermostatic switch means, indicated generally at **29**, which is positioned within the torso or trunk covering and enclosing garment means **10** adjacent to the wearer's body and which is electrically connected in series with said electric power supply means **28** and said heat-producing heating element **25**. The thermostatic switch means **29** is so arranged as to be operable in a circuit-breaking or circuit-opening direction at a controllably adjustable upper control temperature such as, for example, somewhere in the neighborhood of 70 degrees, and so as to be operable in a circuit-closing manner at a controllably adjustable lower control temperature such as somewhere in the neighborhood of 60 degrees whereby to maintain the temperature in the heated interior **18** within a predetermined minimum-to-maximum range. Adjustment of the control temperature range of the thermostat **29** is accomplished by the adjusting knob **30** in a conventional manner which is not thought to require explanation in detail since such arrangements are well known in the art.

In the specific example illustrated, the joined base member **22** and cover member **23** of the heat-producing means **12** are fastened (adhesively, cohesively, or otherwise) to the outer surface of the inner liner **13** between said inner liner and the outer insulating member **11**, with additional thermal insulation material **31** positioned therebetween whereby to minimize heat loss from the heated interior **18** so that the thermostatic switch means **29** will effectively maintain the circuit to the heat-producing means **12** in open condition for a very substantial period of time when the heated garment is being used so as to minimize current drain on the power supply means **28**.

This heat loss prevention feature of the present invention is extremely important and can be further enhanced by the provision of an additional type of insulating means such as is illustrated in FIG. 5 comprising an inwardly directed heat-reflecting means **32** adapted to reflect radiant heat energy inwardly. This type of heat-reflecting means acts very much like a mirror and is usually made of thin metallic material of a flexible nature (sometimes of woven metallic fiber and other times of formed or deposited thin metallic film form) and of a specular nature capable

of reflecting radiant heat inwardly so as to retain heat within the closed and sealed heated garment. One such material is known in the trade as "milium" and is made of aluminum material formed in the manner indicated above. The use of this type of radiant-energy-reflecting insulator 32, in addition to the insulating material 31*a*, which is of a type inhibiting heat loss by thermal conduction, provides a very effective composite heat-retaining means for the heated garment of the present invention, which further minimizes current drain on the electric power supply means.

Parts similar to those illustrated in the first form of the invention are indicated by similar reference numerals, followed by the letter "*a*," however.

The preferred form of the invention illustrated in FIGS. 1–4, 6 and 7, includes means for supporting the electric power supply means 28, said means comprising support loop means 33 carried by the belt 16 and fastened to each of the two batteries 28 comprising the electric power supply means in this form of the invention.

It should be noted that the base and cover members 22 and 23 of the heat-producing means 12 are preferably made of liquid-impervious material, such as certain of the flexible thin-sheet plastic materials like polyvinyl resin, or the like, whereby to prevent moisture from entering the interior of the heat-producing means 12 and possibly shorting out various portions of the heating element means 25.

It should be noted that the garment indicated at 10 is normally adapted to be worn as a garment underneath an outer covering garment such as a windbreaker, jacket, coat, parka, or the like, although not necessarily specifically so limited. In the event that it is to be worn as an outer garment, it may be provided with sleeves and suitable sealing means at the wrists, if desired.

FIGS. 6–8 illustrate the detail of a typical battery comprising the power supply means in the first form of the invention. It will be noted that this battery is of a storage battery type adapted to be recharged from a conventional 110–120 A.C. power line by merely plugging it into an A.C. outlet through a controllably engageable and disengageable adapter, such as is indicated at 38 in FIG. 8, which includes appropriate rectifier means and, if needed, input transformer means or various other voltage and/or current modification and/or control means, as needed. This is not shown in detail since such arrangements are well known in the art. This means that a user of the apparatus of the present invention would normally have a spare battery which has been plugged through the adapter means 38 into an A.C. outlet and has been fully charged, so that, when the battery in the heated garment of the present invention becomes discharged to a point that it is no longer effective for heating purposes, the user may merely remove it and replace it with the fully charged battery. When this is done, the adapter means 38 will be placed between the discharged battery and the A.C. outlet whereby it will be fully charged and ready for use when it is next needed.

FIG. 9 illustrates, in electrical schematic form, the connection of the two power supply means 28, through the connection means 27, the input leads 26, and the controllably adjustable thermostatic switch means 29, to the heating element means 25. It should be noted that an additional lead L connects the two batteries 28 in series and extends around and across the inside of the back of the garment 10 above the level of the belt 16 thereof. However, various other arrangements may be employed including having the heating element 25 in separable portions, each series-connected to its own battery 28, or in various other electrically connected arrangements.

FIGS. 10 and 11 illustrate a slight modification of the invention wherein the flexible torso or trunk-covering or trunk-enclosing means indicated generally at 10*a* in FIG. 10 is substantially identical in all respects to that indicated by the reference numeral 10 in the first form of the invention illustrated in FIGS. 1–4, and similar reference numerals, followed by the letter "*b*," however, indicate similar parts, which, because of their similarity, are not believed to require a repetitious, full, and complete description thereof since such a description would be redundant.

However, in this modification, the electric power supply means, indicated generally at 28*b*, takes a slightly different form from that indicated at 28 in the first form of the invention illustrated in FIGS. 1–4. This is illustrated in somewhat enlarged form with respect to one of the modified power supply means 28*b* in FIG. 11, wherein it is shown to comprise what is known as a "fuel cell," which actually is an electrochemical device for producing electricity as a result of electrochemical action involving two dissimilar materials (such as fuel and a source of oxygen). The principle is quite similar to a battery except that the two dissimilar materials in a battery are initially present in the entire quantity which will be used through the entire useful working life of the battery.

However, in the "fuel cell" illustrated at 28*b* in FIGS. 10 and 11, the materials involved in the electrochemical action are continuously supplied to the "fuel cell" center chamber 39 from hollow pressure vessels 40 and 41 through input connections 42 and 43.

While the pressure vessels 40 and 41 may carry various different materials adapted for use in a "fuel cell," for illustrative purposes only and not in a limiting sense, it is pointed out that the pressure vessel 40 might contain oxygen under pressure while the pressure vessel 41 might contain hydrogen under pressure. These are exemplary only since various materials capable of combustion together may be employed and have been so employed in various fuel cells well-known in the art. However, for purposes of illustration, the oxygen and hydrogen form of the invention is quite adequate to impart an understanding of the principle involved. The oxygen enters the central chamber 39 through inlet 42 adjacent the electrode 44 which may comprise a piece of nickel screen or the like, although not specifically so limited. The hydrogen enters the intermediate or central chamber 39 through the inlet 43 closely adjacent to the other electrode 45, which may also be a nickel electrode of fine wire screen construction, although not specifically so limited.

The electrodes 44 and 45 are usually coated with a suitable catalyst such as platinum black, although not specifically so limited, and are immersed in the electrolyte 46 which may comprise potassium hydroxide, or the like, although not specifically so limited.

An intervening ion exchange wall or the like may be provided, as indicated in broken lines at 47, or in certain forms of the invention, may be eliminated entirely.

The oxygen molecules are disassociated at the electrode 44, which effectively comprises an interior cathode, into atomic oxygen, while the hydrogen molecules are disassociated into atomic hydrogen at the electrode 45, which effectively comprises an interior anode. This action in the electrolyte 46 is facilitated by the catalyst such as platinum black, or the like, carried by the two electrodes 44 and 45, and results in the cathode 44 and the anode 45 exchanging charges through the electrolyte by ion movement, negatively charged hydroxyl (OH—) ions, therethrough from cathode to anode in a manner such that the external circuit connected to the two electrodes 44 and 45 will have electron flow therethrough from electrode 45 to electrode 44 in accordance with the electromotive force produced across the electrodes.

Each of the pressure vessels 40 and 41 is adapted to be recharged with oxygen and hydrogen through normally closed input connections 48.

The oxygen and hydrogen combine as a result of the above-described operation to form a much smaller volume of water, which will ultimately dilute the electrolyte 46,

which can be drained and replaced after long periods of operation through suitable drain means such as that indicated at 49 in FIG. 11, although not specifically so limited.

It should be clearly noted that FIG. 11 illustrates an arrangement which appears to include only one fuel cell. This is done for drawing simplification purposes and in order to make it possible to readily explain the operation thereof as has been done hereinabove. However, in actual practice, it should be noted that normally the power supply means 28*b* would include a number of such fuel cells (which are normally very small) all connected in series whereby to provide an output voltage of the desired amount for effective cooperation with the heat-producing means indicated generally at 12*b* in FIG. 10.

FIG. 12 illustrates a slightly modified version of the invention wherein it comprises a heated garment, indicated generally at 10*c*, for an animal torso, such as for a dog torso, or the like. In this modification of the invention, similar or corresponding parts are indicated by similar reference numerals, followed by "*c*," however. It is not believed necessary to describe all of the elements of this modification of the invention in detail since they are basically similar to those already described in detail in connection with the first form of the invention indicated in FIGS. 1–4. However, in this modification, it should be noted that there is no belt corresponding to that shown in the first form of the invention. Furthermore, in this modification, the means for supporting the electric power supply means comprises a single pocket 33*c* carried on the outside of the garment 10*c* in a location lying over the dog's dorsal region, and it is provided with appropriate snap fasteners 50 for controlling the opening and closing of same. Also, alternatively or additionally, the heated garment 10*c* may be provided with fastening means comprising the multiple strap portions 51 and 52 with each of the strap portions 51 being provided with buckle means 53 cooperable with the opposed strap portion 52 for controllably adjustable fastening engagement with respect thereto for firmly fastening the heated garment 10*c* around the torso of a dog or other animal. It should be noted that the heated animal blanket form of the invention has sealing means similar to the first form of the invention previously described and illustrated in detail in FIGS. 1–4. Other portions of the heated animal blanket form of the invention are basically similar to the corresponding elements of the first form of the invention and further detailed description is thought to be redundant.

It should be noted that the outer insulating member may be made of various materials which comprise effective thermal insulators and/or which, in certain cases, may be liquid-impervious, and that the inner liner may also be made of various suitable materials, either plastic or fabric. The insulating material may be of a type comprising a cellular material having a very substantial percentage of hollow cells therein, such as polyurethane foam, sponge rubber, or various other similar materials, or may be made of flocked or finely divided particles or strands of insulating material such as Dacron down (usually quilted), or the like, separated by air spaces or any other suitable insulating material.

It should be understood that the figures and the specific description thereof set forth in this application are for the purpose of illustrating the present invention and are not to be construed as limiting the present invention to the precise and detailed specific structure shown in the figures and specifically described hereinbefore. Rather, the real invention is intended to include substantially equivalent constructions embodying the basic teachings and inventive concept of the present invention.

I claim:

1. An electrically heated torso covering garment, comprising: flexible torso covering means including outer flexible insulating means provided adjacent the inner side thereof with electrically energizable heat-producing means; and electric power supply means and means for electrically connecting same to said heat-producing means for electrically energizing same; said torso covering means being provided with a plurality of individual, separate, continuous, inwardly projecting, elastically compressible, air-impervious sealing edge portions defining a plurality of individual, separate, complete closed-loop exit apertures for a plurality of different extended torso portions of a body passing through and extending substantially beyond said complete closed-loop exit apertures; each of said complete closed-loop exit apertures being provided with a corresponding one of said continuous, elastically compressible, air-impervious sealing edge portions extending inwardly therefrom completely around the inner periphery of said exit aperture whereby to define a continuous, closed-loop inwardly extending, air-flow-preventing gasket means effectively comprising said exit aperture; said continuous, closed-loop, inwardly extending, air-flow-preventing gasket means being cooperable for forcible elastic air-flow-preventing engagement with a corresponding different one of said extended torso portions whereby to inhibit heat loss through said exit aperture from the interior of the heated torso covering means.

2. A garment of the character defined in claim 1, including an inner flexible liner means positioned immediately inside of said heat-producing means and being substantially coextensive with said outer insulating means and being joined thereto to define said torso covering means.

3. A garment of the character defined in claim 1, wherein said torso covering means is provided with fastening means for fastening same in sealed covering relationship around at least a portion of a torso.

4. A garment of the character defined in claim 1, wherein said outer insulating means comprises inwardly directed heat-reflecting means.

5. A garment of the character defined in claim 1, wherein said torso covering means is provided with support means for removably carrying said electric power supply means.

6. A garment of the character defined in claim 1, including thermostatic switch means carried by the torso covering means in thermal communication with the interior thereof and electrically connected in circuit with said electric power supply means and said heat-producing means and operable in a circuit-breaking manner at an upper control temperature and operable in a circuit-closing manner at a lower control temperature whereby to maintain the temperature within the torso covering means around at least a portion of a torso within a predetermined minimum-to-maximum temperature range.

7. A garment of the character defined in claim 1, wherein said electric power supply means comprises fuel cell means for producing electric power as a result of oxidation of fuel.

8. A garment of the character defined in claim 1, wherein said heat-producing means comprises a flat thin-sheet base member of electrically insulating material and a similar cover member of electrically insulating material adhesively joined together and provided therebetween in adhesively centrally mounted location with heating element means comprising tortuous path, electrically resistive means provided with input means extending beyond the joined base and cover members and in electrically conductive relationship with said connection means for connection to said electric power supply means.

9. A garment of the character defined in claim 8, wherein said base and cover members are of liquid-impervious material.

10. An electrically heated garment comprising flexible torso covering means including outer flexible insulating means provided adjacent the inner side thereof with elec-

trically energizable heat-producing means; said torso covering means being provided with a plurality of individual, separate, continuous, inwardly projecting, elastically compressible, air-impervious sealing edge portions defining a plurality of individual, separate, complete closed-loop exit apertures for a plurality of different extended torso portions of a body passing through and extending substantially beyond said complete closed-loop exit apertures; each of said complete closed-loop exit apertures being provided with a corresponding one of said continuous, elastically compressible, air-impervious sealing edge portions extending inwardly therefrom completely around the inner periphery of said exit aperture whereby to define a continuous, closed-loop inwardly extending, air-flow-preventing gasket means effectively comprising said exit aperture; said continuous, closed-loop, inwardly extending, air-flow-preventing gasket means being cooperable for forcible elastic air-flow-preventing engagement with a corresponding different one of said extended torso portions whereby to inhibit heat loss through said exit aperture from the interior of the heated torso covering means.

11. A garment of the character defined in claim 10, including an inner flexible liner means positioned immediately inside of said heat-producing means and being substantially coextensive with said outer insulating means and being joined thereto to define said torso covering means.

12. A garment of the character defined in claim 10, wherein said torso covering means is provided with fastening means for fastening same in sealed covering relationship around at least a portion of a torso.

13. A garment of the character defined in claim 10, wherein said outer insulating means comprises inwardly directed heat-reflecting means.

14. A garment of the character defined in claim 10, including flexible means encompassing said heat-producing means.

15. A garment of the character defined in claim 10, including said torso covering means is provided with support means for removably carrying an electric power supply means.

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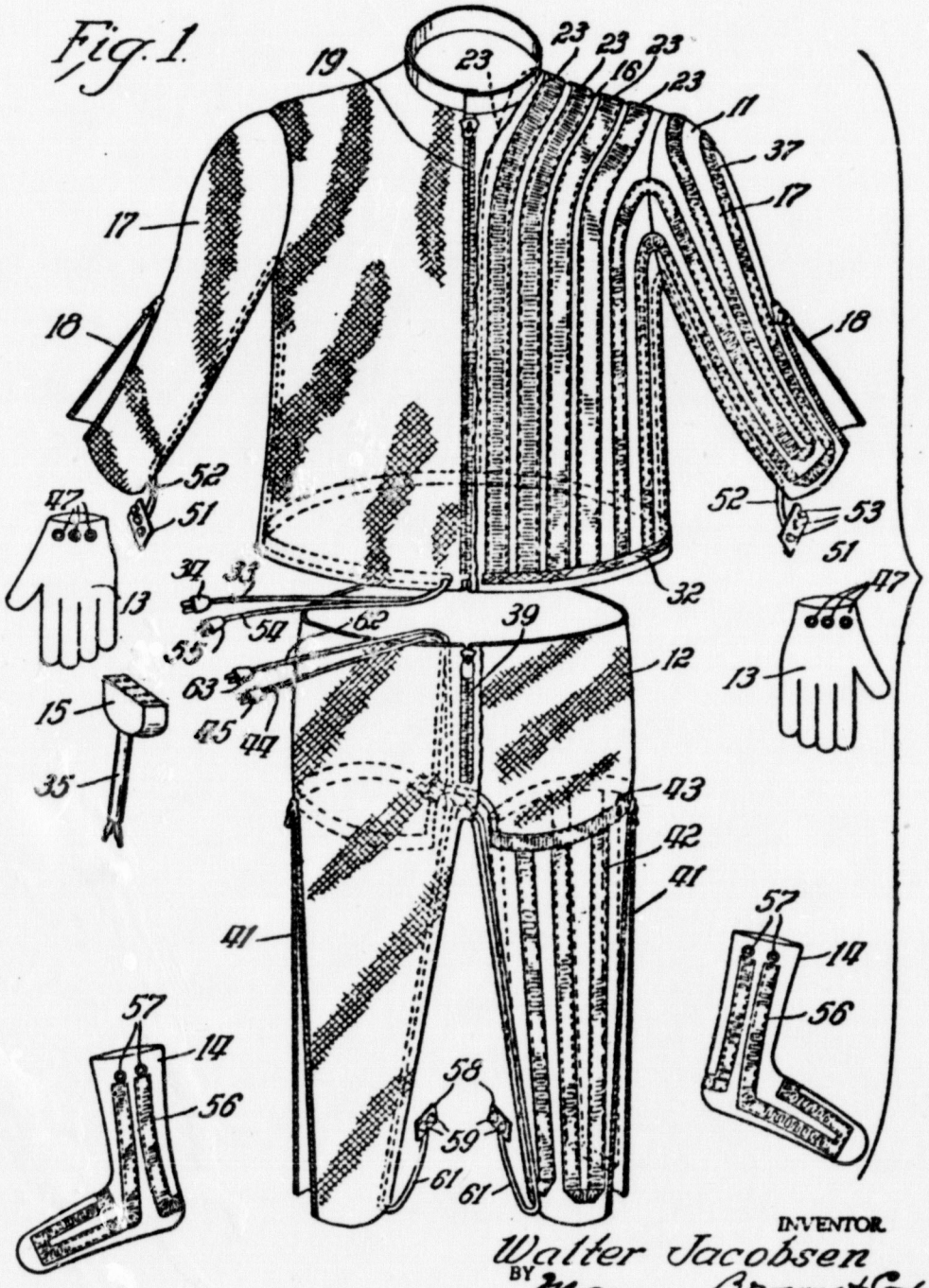
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ELECTRICALLY HEATED FLYING SUIT

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Fig. 1.



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Fig. 2.

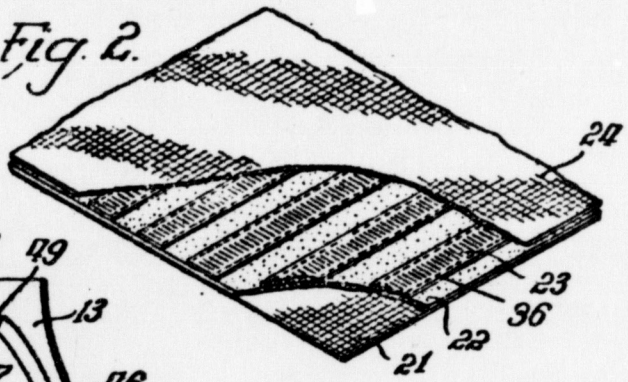


Fig. 3.

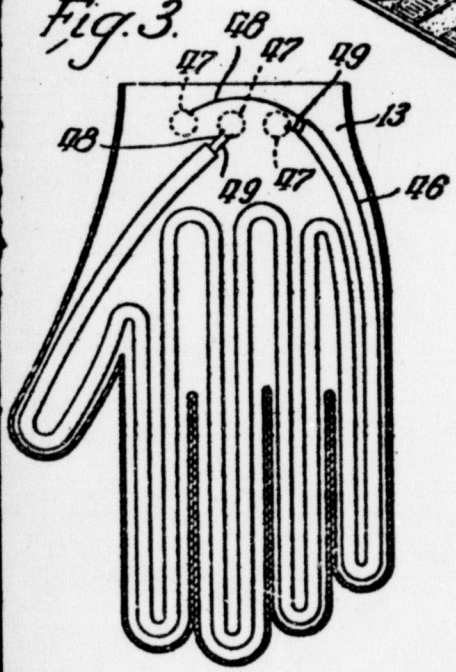


Fig. 4.

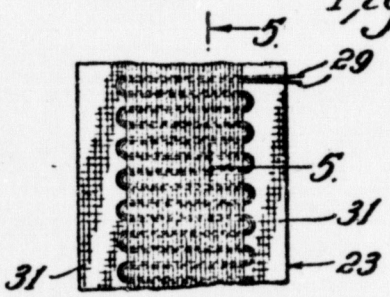


Fig. 5.

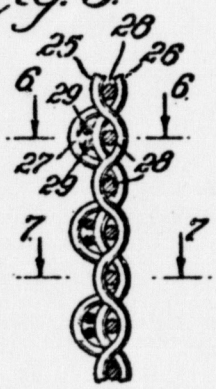


Fig. 6.

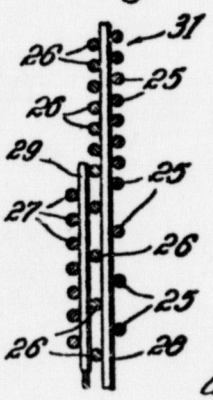
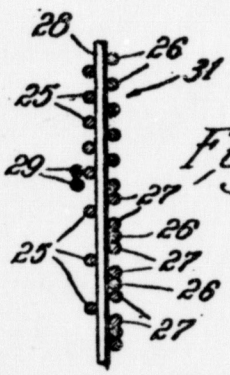


Fig. 7



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Fig. 8.

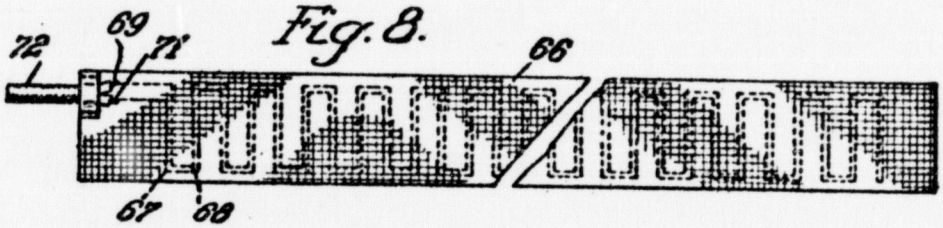


Fig. 9.

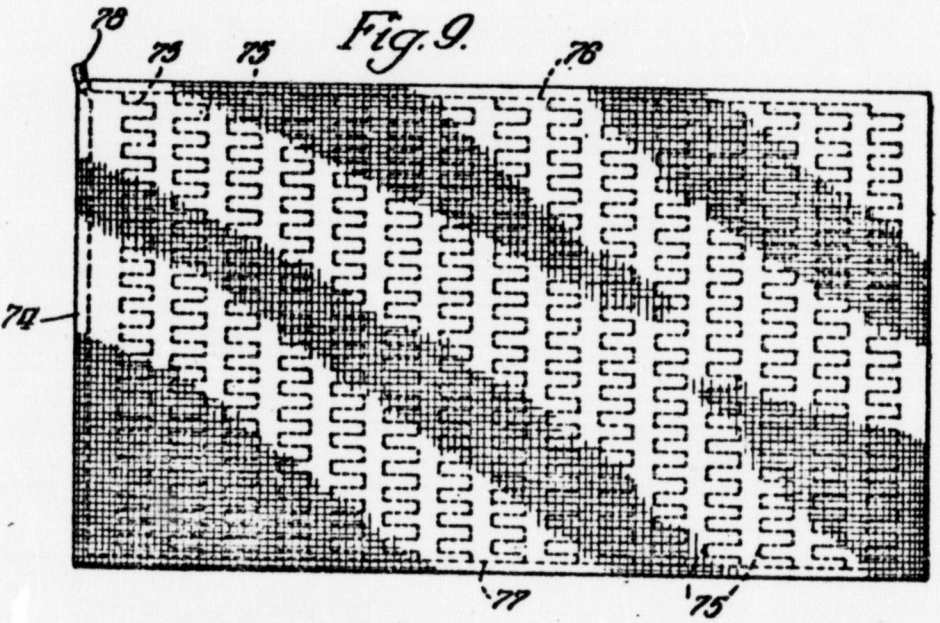
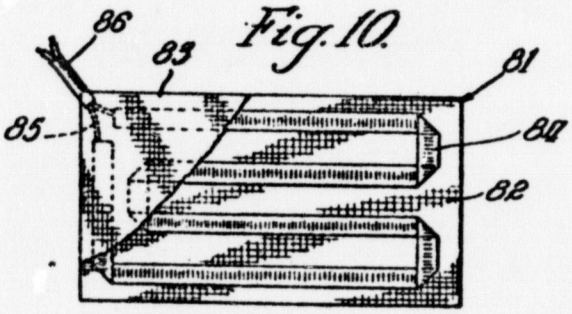


Fig. 10.



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UNITED STATES PATENT OFFICE

2,329,766

ELECTRICALLY HEATED FLYING SUIT

Walter Jacobsen, Chicago, Ill.

Application April 27, 1942, Serial No. 440,537

11 Claims. (Cl. 219—46)

My invention relates to electrically heated fabrics and particularly to such fabrics made up into articles of clothing or other covering members for keeping the human body, or parts of the body warm. More particularly this invention relates to electrically heated suits, such as are employed by aviators flying at high altitudes or in cold weather, and to other electrically heated body-warming devices such as electric blankets, electric heating pads and electric bandages for therapeutic purposes.

One of the principal objects of this invention is to provide fabric containing electric resistance elements, the fabric being in such a form that it can be easily fabricated into various articles of clothing and into articles of clothing of different sizes to fit different people. More particularly, it is an object of this invention to provide a fabric tape containing an electric heating element and so constructed that it can be readily sewn into position on a foundation garment, a plurality of lengths of tape being used to cover the desired area of the garment.

Another object of this invention is to provide an electrically heated fabric covering member, such as a portion of a suit, blanket, or the like, which shall have substantially more flexibility than has previously been provided in articles of this type and which will therefore conform more easily to the shape of the body.

The principal feature of the present invention comprises the provision of a fabric tape having a fine electric wire woven into it, the wire extending along the tape in short steps and extending across the tape in comparatively long runs so that each running foot of the tape contains several feet of wire. Because of this, the tape is quite flexible in a longitudinal direction and the tape is narrow enough so that its lateral stiffness, due to the straight lengths of wire running across it, does not stiffen any large continuous area of the garment to which it is sewn.

Another important feature of the invention is the way in which the tape containing the electric wires is woven so that there is no wire along its edges, which allows it to be sewn by machine to a foundation garment without any danger of the wires being injured.

These and other objects and features of the invention will be apparent from the following description and appended claims and the accompanying drawings, in which,

Fig. 1 is a perspective view of a complete flying suit embodying the invention, the various parts of the suit being separated slightly from each other in order to show them more clearly;

Fig. 2 is a broken-away perspective view showing a detail of the construction of the suit shown in Fig. 1;

Fig. 3 is a plan view of the interior of a glove forming a portion of the suit shown in Fig. 1;

Fig. 4 is a plan view of a portion of the tape used in the suit shown in Fig. 1;

Fig. 5 is a longitudinal diagrammatic section on an enlarged scale, on the line 5—5 of Fig. 4, looking in the direction of the arrows;

Figs. 6 and 7 are diagrammatic cross sections on the lines 6—6 and 7—7 of Fig. 5, looking in the direction of the arrows;

Fig. 8 is a plan view of an electrically heated bandage embodying the invention;

Fig. 9 is a plan view of an electrically heated blanket embodying the invention; and

Fig. 10 is a plan view of an electric heating pad embodying the invention.

The embodiment of the invention shown in Fig. 1 comprises a jacket 11, a pair of trousers 12, a pair of gloves 13, a pair of stockings 14, and an external connector 15 through which the various portions of the suit are connected to a source of electric energy. The jacket 11 is generally conventional in shape and comprises a body portion 16 and two sleeves 17. The sleeves 17 may be of the same size as the sleeves in an ordinary coat or jacket, but it is preferable to taper them towards the wrist so that they will fit closely and have less area than an ordinary sleeve. With the smaller area there is less loss of heat. Each sleeve is therefore provided with a slide fastener 18 extending approximately half way up from the wrist in order to facilitate the putting on and taking off of the garment. The body of the jacket is provided with a single slide fastener 19 in front in the conventional manner.

As shown more clearly in Fig. 2, the jacket is formed in four layers, first, an outer layer 21 of plain cloth; second, an intermediate layer 22 of warm knitted or woven fabric made, for instance, of wool; third, a layer of woven heating tape 23; and fourth, a cloth lining 24.

The heating tape 23, as shown in Figs. 4 to 7, is a strip of woven fabric formed by three sets of woolen weft threads 25, 26 and 27, a woolen warp thread 28, and a pair of fine insulated wires 29 forming an additional warp. The two sets of weft threads 25 and 26 and the warp thread 28 are interwoven to form a plain square weave, except that the weft threads are much closer together in the actual tape than are the warp threads, so

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that the surface of the fabric is formed entirely by the weft threads.

The third set of weft threads 27 passes under alternate warp threads 28 with one of the other sets of weft threads 26, but, where it passes over the other warp threads 28, it also passes over the fine wires 29 and thus secures them to the face of the fabric formed by the other threads 25, 26 and 28. The resultant complete fabric is thus smooth on one side, but every alternate pick or run of the woof thread 28 has a pick or run of the wires 29 over it. The wires 29, where they run across the tape, are completely covered by the third weft 27 because the weft threads 27 are twice as numerous as either the weft threads 25 or the weft threads 26.

As may be seen from Fig. 4, the successive picks or runs of the wires 29 across the tape do not extend to the edges of the tape, so that a selvage 31 without any wire in it is left along each side of the tape. The selvage 31 has a plain square weave formed by the weft threads 25 and 26 and the warp thread 28, the third weft 27 being absent from this portion of the tape.

In Fig. 1 the outer and intermediate layers 21 and 22 have been broken away from a part of the jacket to show the arrangement of the tapes 23. There are four lengths of wide tape 23 on each side of the jacket, each length starting in front at the waist, running up over the shoulder and down to the waist at the back. The wires in each tape are connected at their ends to a pair of conductors which encircle the garment at the bottom and are enclosed in a binding 32 sewn to the body of the garment. The two conductors in the tape 32 are connected to a flexible electric cord 33 which terminates in a plug 34. The plug 34 fits into the connector 15, which is on the end of an electric cord 35 through which electricity for the entire suit is supplied.

The four wide tapes 23 which extend over the shoulder of the jacket 11 are spaced evenly out from the center line at the front and the back of the jacket, leaving an area at the side which is heated by a group of narrower tapes 37, each of which starts at the waist, extends up to the shoulder, loops down onto the sleeve, and back to the shoulder, and then extends down to the waist again. The ends of each narrow tape 37, like the ends of the wider tapes 23, are connected to the wires enclosed in the binding 32 around the waist of the jacket. Since the tapes 37, which extend onto the sleeve 17, are considerably narrower than the body tapes 23, the length of electric wire per running foot is considerably smaller than the length of electric wire per running foot of the body tapes 23, and these lengths per running foot are proportioned so that the total length of wire in each of the narrow sleeve tapes 37 will be approximately the same as the total length of wire in each of the body tapes 23.

All of the tapes 23 and 37 carrying the electric heating wires are secured in place by being stitched to the intermediate or foundation layer 22 of the jacket, the stitches 26 being along the edges of the tapes so that there is no danger of injuring the electric wires 29 when the sewing is being done.

The trousers 12 are of the same general construction as the jacket 11 and are formed of layers arranged in the same way. Besides the conventional front slide fastener 39, each leg of the trousers is provided with a slide fastener 41 down the side so that the legs can be somewhat closer fitting than conventional trouser legs, if desired, and still be easy to put on. The tapes 42 which form the heating elements of the trousers are similar to the tapes 23 on the body portion of the jacket and extend down in loops from bindings 43 which encircle each leg just below the hips. The bindings 43 contain a pair of conductors to which the ends of the wires in the heating tapes 42 are connected. The conductors in the bindings 43, in turn, are connected to an electric wire 44 which terminates in a plug 45 by means of which a connection can be made with the connector 15. The heating tapes 42 are terminated on a line below the hips because the upper part of the trousers 12 is covered by the lower part of the jacket 11 when the suit is in use and heat is supplied over this area by the jacket.

Each glove 13 is provided with a single length of heating tape 46 constructed in the same way as the heating tape 23, illustrated in detail in Figs. 4 to 7, but considerably narrower. The tape 46 is arranged on the inside of the glove with one loop extending down on the back of each finger and the thumb, as shown in Fig. 3. The glove 13 is provided with the female parts 47 of three snap fasteners sewn on the back of the glove near the wrist. One end of each of the two wires 48 and 49 in the tape 46 is secured to one of these parts of the snap fasteners, and the other ends of the two wires 48 and 49 are each secured to one of the other two parts of the snap fasteners. Thus one snap fastener provides a common connection to each of the two wires 48 and 49, and the other two snap fasteners provide connections to the other ends of these wires.

Each sleeve 17 of the jacket has a small pad 51 secured to its lower end by a wire 52 and carrying the male parts 53 of the three snap fasteners. The electric wires 52 extend up the sleeves, down the body of the jacket, and are connected to a single electric cord 54 which emerges from the jacket along with the electric cord 33 and carries a plug 55 which fits into the connector 15. One of the parts 53 of the snap fasteners on each pad 51 is connected to one conductor in the electric wire 52 and the other two snap fastener parts are connected to the other conductor 53 so that the proper connection can be made to the snap fastener parts 47 on the gloves 13. If the three snaps on the glove 13 and pad 51 are connected together, both of the wires 48 and 49 will be provided with current, but, if less heat is desired, one of the snaps to which a single wire is connected may be unsnapped to break the connection to that wire and permit current to flow only through the other wire.

The socks 14 are each provided with a single length of tape 56 similar to, but narrower than the tape 23 illustrated in Figs. 4 to 7. The tape 56 begins and ends at the female parts 57 of a pair of snap fasteners sewn to the stocking 14 near its upper end, and it extends up and down the leg of the stocking and along the foot in suitably arranged loops. The loops of tape 56 may, if desired, extend over the sole or under part of the foot of the stocking 14, but it has been found that this makes the stocking slightly uncomfortable to walk with and that sufficient heat can be provided by having loops of the heating tape 56 on only the sides and top of the foot.

At the bottom of the legs of the trousers 14, there are provided pads 58 on which are sewn the male parts 59 of the snap fasteners whose female parts 57 are located on the stockings 14.

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Each pad 58 is carried at the end of an electric wire 61 which extends up the inside of the trouser leg. The two electric wires 61 join to form a single wire 62 which extends out from the trousers along with the wire 44 through which current is supplied to the heating tapes of the trousers, and a plug 63 is provided on the end of the wire 62 for making a connection with the connector 15.

The various parts of the flying suit could, if desired, be made as a one piece garment, like a child's sleeping suit or like a mechanic's jumper, but it is preferable to make the jacket separate from the trousers, as shown, and to make the gloves and socks separate from the jacket and trousers. The garments can then be put on, one at a time, and connected together and to the connector 15 after they are on. The connector 15 is connected to a source of electric current through the wire 35, and the amount of current supplied to the suit is controlled through a rheostat or other control unit placed in series with one of the conductors in the wire 35. In case the current for the suit is alternating, the control unit may, if weight permits, be a variable voltage transformer.

In manufacturing the form of the invention shown in Figs. 1 to 7 and described above, the various widths of heating tape 23, 42, 46 and 56 are made in continuous lengths on suitable looms, and the making up of the tapes and other fabrics into individual garments is done in substantially the same way as ordinary garments are made. This permits the garments to be made with a minimum of special equipment and also permits them to be made easily in various sizes in order to fit different people.

Another form of the invention is shown in Fig. 8 and consists of a bandage 66 made in substantially the same way as the tape illustrated in Figs. 4 to 7. At one end of the bandage the two wires 67 and 68 which are woven into it are connected together, and, at the other end of the bandage, the two wires 67 and 68 are connected to the two conductors 69 and 71 of an electric wire 72 fastened to the bandage. In use, the bandage is wound around a limb or other portion of the body which is to be kept warm, and the electric wire 72 is connected to a suitable source of electric current through a conventional control unit, such as a rheostat.

Another form of the invention is shown in Fig. 9 and consists of a blanket 74 provided with a series of wires 75 woven into the blanket in long parallel zones extending from one edge of the blanket to the other. Each wire 75 extends along the zone which it occupies in short steps at either side of the zone, the successive short steps being joined by relatively long runs across the zone. Thus the arrangement of each wire 75 is substantially the same as the arrangement of the wires 29 in the tape illustrated in Figs. 4 to 7. The wires 75 arranged in this way will provide the desired heating capacity without making the blanket stiff. The blanket will be flexible in a direction along the length of the zones occupied by the wires 75 because there are several inches of wire in each inch along the zone, and the blanket will be flexible in a direction transverse on the zones because the successive zones are separated by flexible spaces in which there are no wires.

The ends of the wires 75 are connected to flexible conductors 76 and 77 which extend along the edges of the blanket and which are connected at one corner of the blanket to an electric wire 78. The electric wire 78 may lead to a conventional manual or automatic control unit through which the amount of current flowing in the blanket may be regulated.

Another form of the invention, shown in Fig. 10, is a heating pad 81 formed of two layers of fabric 82 and 83 between which is located a heating tape 84. The tape 84 is of the same construction as the tape illustrated in detail in Figs. 4 to 7, and the wires 85 which it contains are connected to an electric wire 86 leading from one corner of the pad. The tape 84 is looped back and forth between the two layers 82 and 83 of the pad in such a manner as to substantially cover the area of the pad, as shown in the drawings. This construction is especially advantageous for a heating pad because it permits pads of various sizes to be readily made from a single size of tape 84, the tape in large pads being arranged in two or more strips connected to the electric wire 86 in parallel. This construction may also be used for a blanket.

It may be pointed out that, in each of the different forms of the invention, special advantages flow from my novel construction. Because the wires in each tape in the flying suit are each several times as long as the tape itself, the wires in the several tapes can be all connected in parallel and still operate properly with the voltage available in a conventional airplane, and, with the wires in parallel, only one or two of them will be damaged by accidental local damage to the suit. In every form of the invention, the close spacing of the wire permits the desired heating effect to be secured with the wire heated to a low temperature; this, in turn, permits the use of wire which is insulated simply by a coat of enamel and a cotton covering; and this simple insulation permits the garment, bandage, blanket, or heating pad to be washed without damage. In the case of the heating pad, as well as the other forms of the invention, the simple insulation permits the article to be folded, if desired, as contrasted to conventional heating pads having asbestos insulation, which is damaged by folding of the pad.

While I have shown and described only a few forms of my invention, it will be understood that it can be carried out in other ways which will suggest themselves to the person skilled in the art. Other variations than those shown may also be made. For example, the two wires 29 in the tape may be separated and located over alternate picks of the warp 28, one wire may be larger than the other to provide more heat, and the two wires may be connected to the source of current through switches which will permit current to flow through either one or both wires in accordance with the amount of heat desired. Instead of the wires in each tape in the flying suit being double, there may be only one or there may be more than two, and the same variation may be made in the other forms of the invention. The number of layers in the garment may be reduced, as by sewing the tape directly to the lining, which then becomes the foundation of the garment, and providing only a single layer of warm cloth outside of this. My invention, therefore, is not limited to the specific constructions which I have shown and described, but includes any construction falling within the terms of any one or more of the following claims.

I claim as my invention:

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1. An electrically heated jacket comprising a foundation jacket with sleeves, a pair of conductors extending around the jacket near the lower edge thereof, a plurality of wide tapes extending side by side over the shoulders and down to said conductors, and a plurality of narrow tapes extending each in a loop up one side of the jacket and down the sleeve, each of said tapes having an electric wire woven therein, the electric wire extending along the tape by short steps joined by relatively long runs across the tape and having its ends connected to the conductors, the narrow tapes being longer than the wide tapes and the runs of the wires across the wide tapes being proportionately longer than the runs of the wires across the narrow tapes whereby the lengths of wire in the different tapes is substantially uniform.

2. An electrically heated textile garment comprising a flexible foundation fabric, a pair of electric leads insulated from each other extending about one extremity of said garment in proximity to each other and protectively secured to said garment, narrow tapes carrying electric conductors secured to said fabric in spaced relation over the extent of said garment, the conductors for each tape comprising two fine wires separately insulated and extending continuously back and forth across said tape contiguous to each other and in substantially parallel relation throughout the length of the corresponding tapes, whereby said garment will have maximum flexibility, said conductors being connected to said leads in parallel, one end of each conductor being secured to one lead and the other end to the other lead whereby the conductors in said tapes are connected in parallel, said tapes being secured on said garment in such lengths that the electrical resistance of the conductors in the tapes will be substantially equal.

3. An electrically heated textile member comprising a flexible foundation fabric, narrow elongated tapes of woven material secured to said fabric in spaced relation by stitching the side edges thereto, a pair of fine wire conductors insulated from each other woven into said tape, each pair as a weft thread extending from said to side of said band throughout the length thereof whereby said tape has a maximum of flexibility, the margin of said tape being free of said conductors.

4. A flexible heating element comprising a woven fabric having a textile weft, an electrically conducting weft, and a textile warp, the electrically conducting weft lying over the textile weft and being separated therefrom and secured thereto by the warp, whereby said textile weft constitutes an insulation for said electrically conducting weft when the latter is turned inwardly in use.

5. A flexible heating element comprising a long narrow tape of textile material having a continuous electric conductor woven therein and extending back and forth crosswise of the tape throughout substantially the length thereof, said conductor consisting of a plurality of fine wires separately insulated and substantially parallel.

6. A flexible heating element comprising a narrow elongated woven tape having a textile warp, a textile weft, and an electrically conducting weft, the electrically conducting weft lying over the textile weft throughout its entire length, certain warp threads lying between the electrically conducting weft and the textile weft, other warp threads lying over the electrically conducting weft, and each pick of the electrically conducting weft terminating short of both edges of the tape.

7. An electrically heated garment comprising a foundation portion constructed and arranged to be worn on the body, and a plurality of lengths of narrow tape secured to the surface of said foundation portion in side by side relation, each of said lengths of tape having an electric fine wire woven therein, the length and widths of said tapes being such that the electrical resistances of the wire therein will be substantially the same.

8. An electrically heated jacket comprising a foundation jacket, a pair of conductors extending around the jacket near the lower edge thereof, and a plurality of narrow elongated tapes extending side by side over the shoulders and down to said conductors, each of said tapes having an electric wire woven therein and connected at its ends to said conductors, the electrical resistance of said wires being substantially the same in all of said tapes.

9. A pair of electrically heated trousers comprising a foundation pair of trousers, a pair of conductors extending around the upper portion of the trousers, one around each leg portion, and a plurality of narrow tapes extending each in a loop down a leg of the trousers, each of said tapes having an electric wire woven therein, each electric wire extending along its tape by short steps joined by relatively long runs across the tape and having its ends connected to the conductors.

10. A pair of electrically heated trousers comprising a foundation pair of trousers, a pair of conductors extending around the upper portion of the trousers, and a plurality of tapes extending each in a loop down a leg of the trousers, each of said tapes having an electric wire woven therein and connected at its ends to said conductors in parallel.

11. An electrically heated garment comprising a foundation portion constructed and arranged to be worn on the body, a plurality of narrow woven tapes secured to said garment extending over at least a portion of the area of said foundation portion, each tape having textile warp threads and a pair of fine wire conductors separately insulated and together constituting a weft thread of said tape, and means for alternatively connecting either or both of said wires to a source of electric current.

WALTER JACOBSEN.

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CERTIFICATE OF CORRECTION.

Patent No. 2,329,766. September 21, 1943.

WALTER JACOBSEN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 47, claim 3, for the words "from said" read --from side--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of November, A. D. 1943.

(Seal)

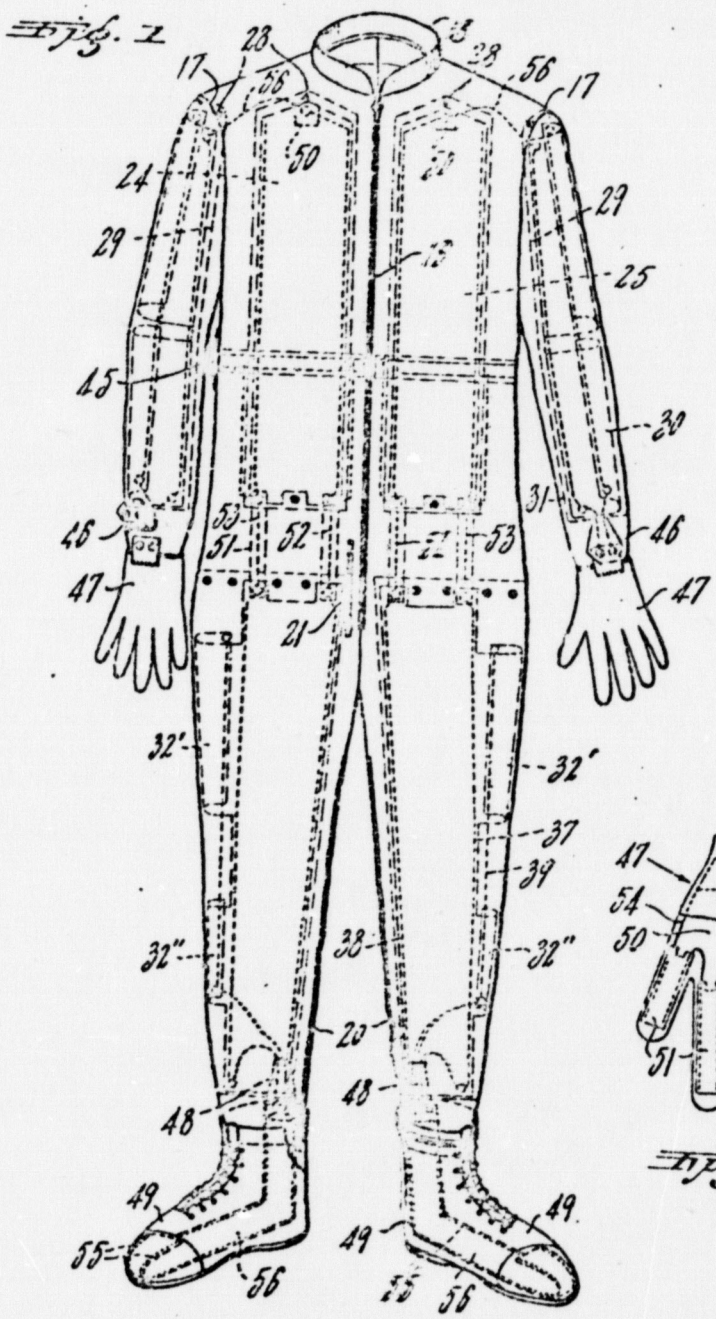
Henry Van Arsdale,
Acting Commissioner of Patents.

March 31, 1942. L. MARICK 2,277,772

ELECTRICALLY HEATED WEARING APPAREL

Filed March 3, 1941 3 Sheets-Sheet 1

Fig. 1



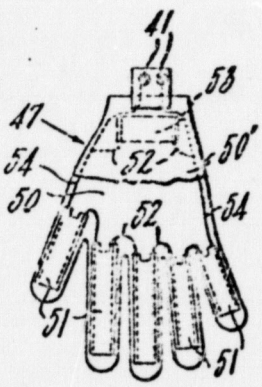


Fig. 10

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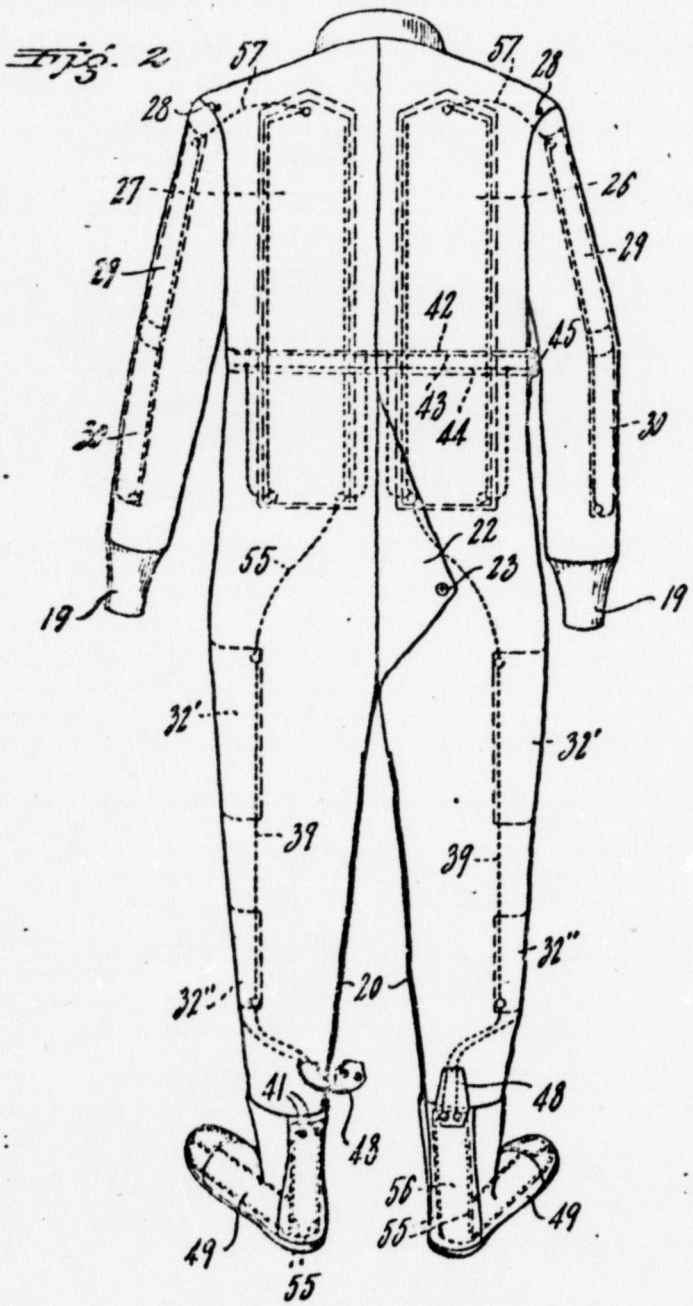
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ELECTRICALLY HEATED WEARING APPAREL

Filed March 8, 1941 3 Sheets-Sheet 2

Fig. 2



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March 31, 1942. L. MARICK 2,277,772

ELECTRICALLY HEATED WEARING APPAREL

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Fig. 3

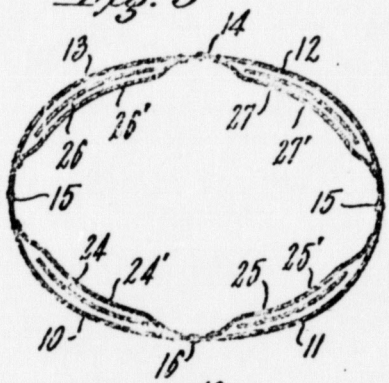
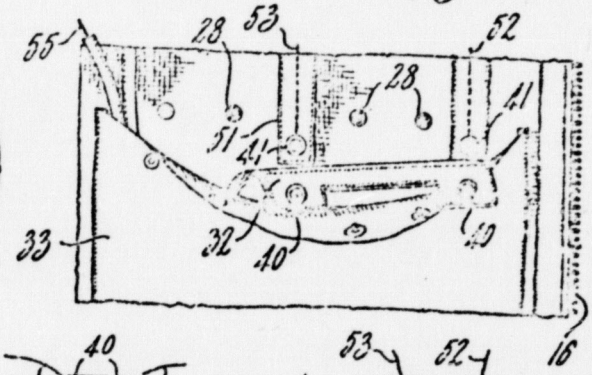


Fig. 4



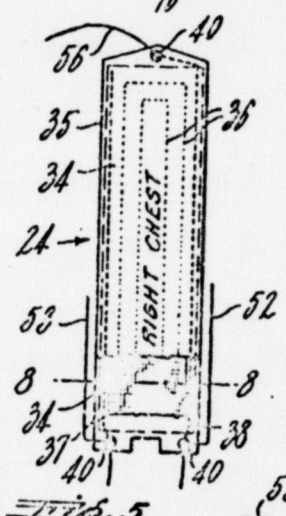


Fig. 5

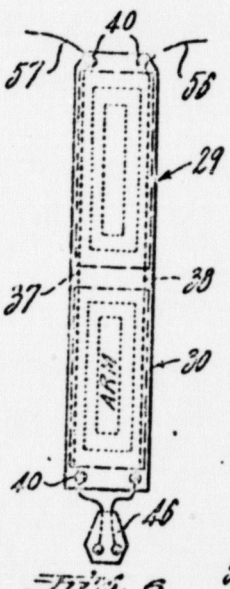


Fig. 6

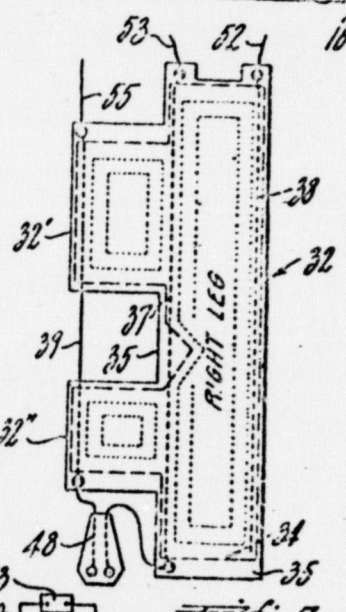


Fig. 7

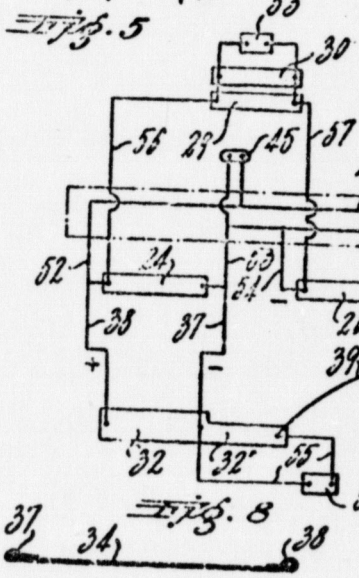


Fig. 8

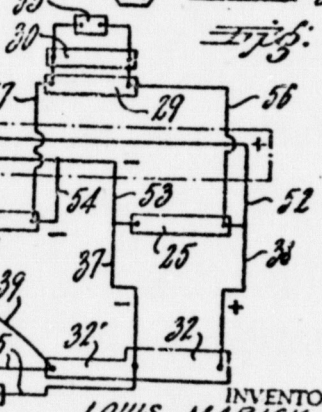


Fig. 9

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Patented Mar. 31, 1942 2,277,772

UNITED STATES PATENT OFFICE

2,277,772

ELECTRICALLY HEATED WEARING APPAREL

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Application March 8, 1941, Serial No. 382,373

17 Claims. (Cl. 219—46)

This invention relates to electrically heated wearing apparel that is particularly well adapted for use by aviators.

This application is a continuation-in-part of my prior application Serial No. 354,347, filed August 13, 1940.

It has been proposed heretofore to provide various type of garments with electrically heated units employing electrical wires as the heating elements. The use of electrically heated wires in clothing, however, is open to a number of objections. One is that it is necessary to operate such wires at a temperature that is sufficiently high to burn the wearer of the garment or possibly his clothing if a heated wire becomes exposed from its protecting covering; another is that if the wire breaks at any point it will put the entire heating element out of operation; still another is that heated wires will not produce heat uniformly over a selected area but produce heat only along the paths where the wires extend, and rely upon radiation and conduction to heat the space between adjacent wires. All of these objections are overcome by the present invention.

Heretofore aviators flying at high altitudes have relied largely upon thick heavy clothing to protect them from the extreme cold, but such heavy clothing interferes seriously with the freedom of the movements of the wearer and adds to the weight which must be carried by the plane. Furthermore, if it becomes necessary for an aviator to bail-out of his plane the added weight of the heavy clothing will greatly increase the shock to which he is likely to be subjected when his parachute opens and checks his fall.

One feature of the present invention resides in an electrically heated garment adapted to cover practically the entire body and limbs and having electrically heated pads extending over a large portion thereof, and which garment is so flexible and light in weight that it may be worn as underwear or possible as an overall in place of the usual coat and trousers, and thereby provide a garment for supplying electrical heat to the major portions of the body and limbs of the wearer, and which garment and heating pads together do not weigh much more than the ordinary business suit.

Another feature of the present invention resides in the novel construction of the electrical heating units employed in the different portions of the garment, each of which may consist of a sheet of supporting material such as woven fabric having deposited thereupon a sufficient amount of current conductive rubber composition to render the sheet capable of generating heat energy when a different electrical potential is maintained between spaced portions of the sheet. Since such a heating unit generates heat uniformly throughout its area and will supply the desired amount of heat to the body when maintained at a temperature not in excess of 130° F., danger of burning the wearer is avoided. Furthermore, the unit is of light weight and is soft and flexible so that it will be comfortable to the wearer even when worn close to the body, and will not appreciably interfere with the freedom of his movement. The operating current may be supplied to such conductive sheet by securing the marginal side edges of the sheet to or around conductor wires so that current will flow across the sheet from one wire to the other.

A further feature of the present invention resides in the construction in which the heating sheet just described is sandwiched between two textile sheets that protect the heating sheet from injury and from coming in direct contact with the fabric of which the garment may be made. This constitutes a soft flexible heating pad that is admirably adapted for heating wearing apparel. Another feature resides in snap fasteners having conductor wires secured to the male and female elements of the snap fasteners to supply electric current thereto. One of these elements is secured to the heating sheet and the other to the garment so that these snap fasteners perform the double function of removably securing the heating sheet in place upon the garment and of supplying the operating current to the spaced conductor wires of the sheet.

A further feature of the present invention resides in a conductor belt extending around a substantial portion of the garment and which is provided with current supply wires that are connected by lead wires to the different heating elements or pads, and still another feature resides in long wide pockets in different portions of the garment adapted to receive heating pads in their extended condition to conceal the pads and hold them in place when the garment is in use, and at the same time facilitate the ready removal of the pads when, for example, the garment is to be laundered, cleaned or replaced.

Other features of the invention and novel arrangement of parts in addition to the above will be hereinafter described in connection with the accompanying drawings which illustrate good practical embodiments of the invention.

In the drawings:

Fig. 1 is a front elevation of an entire garment

of the one-piece underwear type embodying the present invention; and also shows the electrically heated gloves and shoes;

Fig. 2 is a rear view of the garment of Fig. 1;

Fig. 3 is a transverse sectional view taken through the central portion of the garment of Fig. 1 and shows the disposition of the electrically heated pads around the body of the garment;

Fig. 4 on a larger scale is a plan view of the inner face of the left hand front portion of the garment, taken just below the waist line;

Fig. 5 is a plan view with part in section of the electrically heated pad for the right chest;

Fig. 6 is a plan view of the electrically heated pads for the upper and lower portions of an arm;

Fig. 7 is a plan view of the electrically heated pads for the right leg;

Fig. 8 is a section taken on the line 8—8 of Fig. 5 through the heating sheet;

Fig. 9 is a diagram of the wiring for supplying electric current to the pads for heating the body and limbs of the wearer; and

Fig. 10 shows one of the electrically heated gloves with the back thereof partly broken away.

It will be understood that various features of the invention may be embodied in other types of garments and articles of clothing than herein shown, and that garments embodying the present invention may be worn by various persons that remain near a suitable source of electric energy. The invention, however, has been developed more particularly for use by aviators in garments of the general type herein illustrated.

In the particular embodiment of the invention from which the drawings were made the entire suit shown in Figs. 1 and 2 was constructed of a light weight woven one-way stretch satin fabric, with the exception of the collar and lower ends of the sleeves which were made of knitted goods. This constitutes a soft comfortable light weight suit which will stretch and contract transversely through to allow free movement of the body and limbs and conform to the shape of the body and thereby position the heating elements more advantageously.

The body portion of the garment illustrated is formed of the front sections 10 and 11 and rear sections 12 and 13 constructed of said one-way stretch woven elastic fabric arranged to stretch around the body. The back sections are secured together by the seam 14 extending down the center of the back of the garment and the front and rear panels are connected by the side seams 15. The sections 10 and 11 are preferably provided with the slide fastener 16 extending from the collar downwardly to a point below the waistline of the garment as shown in Fig. 1.

The sleeves may be constructed as usual, preferably of the elastic fabric just mentioned, and are secured to the main portion of the garment by the shoulder seam 17. The collar 18 and cuffs 19 are preferably knitted, as above stated, to cause these portions of the garment to fit snugly and comfortably. The legs of the garment preferably extend downwardly nearly to the ankle and a slide fastener 21 is provided at the inseam of each leg to extend upwardly from the lower end of the leg nearly to the crotch. These slide fasteners 16 and 21 enable the wearer to get quickly into and out of the snug fitting garment. In the construction shown a short slide fastener 21' is provided to form a fly opening, and at the rear of the garment a seat opening is provided which is closed by the flap 22 that is held in the closed position by the button 23.

The garment so far described might well be worn as a one-piece union suit. The means herein contemplated for electrically heating various portions of the suit will now be described.

The front portion of the body of the garment is provided with the elongated "right chest" pad 24, which is best shown in Fig. 5, and a similar left chest pad 25. These pads are long enough to extend from adjacent the collar bone downwardly to approximately the waist line of the garment so as to keep the entire front portion of the body of the wearer warm, but terminates short of the waist line so as not to be uncomfortable when the wearer is in a sitting position. The rear portion of the body of the garment is provided with the rear heating pads 26 and 27 which may be about the same size and shape as the front pads just described. Each of these pads is entirely enclosed in a pocket made of the same elastic material above described and which pockets are indicated by the numerals 24', 25', 26' and 27'. It will be seen that since both the main portion of the garment and pockets are capable of stretching laterally, the pockets will not prevent the garment from stretching in the body encircling direction. These pockets are preferably opened at each end to facilitate the introduction of the relatively long wide pads therein and the front pockets 24' and 25' are preferably closed at their upper end by any suitable means such as the ordinary snap fastener 23 so that the wearer will not accidentally stick his hand in the pocket when he is getting into the garment.

Each sleeve is preferably provided with a pair of connected heating pads which are best shown in Fig. 6 wherein the pad for heating the upper portion of the arms is indicated by 29 and that for heating the lower portion of the arm by 30. These two pads terminate a short distance from each other at the elbow of the garment and are connected by a covering fabric to be described. The entire heating unit shown in Fig. 6 consisting of the aligned pads 29 and 30 is adapted to be inserted in a pocket 31 formed inside of each sleeve, which pocket is open at each end but may be closed at its upper end by the snap fasteners 28.

The right leg of the garment is provided with the heating pad best shown in Fig. 7 consisting of the main portion of the pad 32 of rectangular shape and having extending laterally therefrom a pad portion 32' and the second pad portion 32''. The portions 32' and 32'' are adapted to extend around a substantial portion of the leg above and below the knee to heat the thigh and calf respectively. The left leg of the garment is provided with a similar shaped pad. It will be apparent that the pad shown in Fig. 7 is considerably wider than those shown in Figs. 5 and 6. It is therefore necessary to provide each leg portion of the garment with a long wide pocket 33 adapted to receive this large pad. The upper end portion of this pad 32 and pocket 33 are clearly shown in Fig. 4 wherein it will be seen that the upper edge of this pocket is provided with four snap fasteners 23 adapted to hold the pocket closed so that the person using the garment will not accidentally insert his foot in the pocket in putting on the garment.

Each of the electric pads above described is preferably formed of a piece of woven fabric such as ordinary woven cotton material 34, see Fig. 5,

having deposited upon the fabric a sufficient amount of conductive rubber or conductive plastic material to conduct electric current across the pad and thereby generate the desired amount of heat uniformly over the surface of the sheet 34. The conductivity of the treated sheet 34 may be made as great as desired by calendering, spreading or otherwise depositing on the sheet, rubber containing different amounts of conductive carbon black, or by increasing the amount of conductive rubber deposited thereupon.

One example of a good practical electrically conductive cement which may be used to coat the fabric heating element 34 is as follows:

Rubber	100
Conducting carbon black	85
ZnO	15
Antioxidant	.75
Accelerator	2.00
Deodorant	.10
Softener	7.00
Vulcanizing agent	.75
Gasoline	1500

Each conductive rubber sheet 31 is preferably sandwiched between two protecting sheets 35 of fabric such for example as ordinary woven cotton goods, to thereby protect the conductive rubber material from wear and from coming in direct contact with the garment. These covering sheets 35 are preferably sewed together and may be sewed to each other through the conductive sheet 34 as indicated at 36 without substantially interfering with the current conducting or heating properties of the sheet 34.

Electric current is supplied to the pad of Fig. 5 for example by providing the same with the conductor wires 37 and 38 extending longitudinally of the sheet 34 adjacent its marginal side edges and having these edges folded over the wire and adhesively secured about the wire in the folded condition to form the heating unit of Fig. 8. After the sheet 34 and wires have been thus assembled the conductive rubber material may be vulcanized. The sheet 34 of each pad may be heated by a current of 12 volts and its conductive properties should be such as to heat its entire face to a temperature between 90° and 120° F.

All of the pads employed in the present garment may have the construction just described except that since portions of the leg pads are approximately twice as wide as the other pads it is found desirable to provide the leg pad with three current supply wires disposed in spaced parallel relation to each other in place of the two wires 37 and 38. Therefore the pad of Fig. 7 is shown as having the current supply wires 37 and 38 and also an added current supply wire 72. In this construction the wires 37 and 38 may be maintained at the same potential energy while the wire 37 is maintained at a different potential energy to thereby produce a flow of current across the pad 32 and auxiliary pad portions 32' and 32''.

When the sheet 34 treated with the conductive rubber is relatively large it may tend to sweat the portion of the body which it covers if the entire sheet is impervious to air. This difficulty may, however, be readily avoided by omitting the rubber from spaced portions of the sheet for ventilating purposes. For example the rubber may be omitted from spaced narrow strips extending across sheet 34 without appreciably affecting its heating properties or this sheet may be provided at intervals with small ventilating apertures.

In accordance with the present invention each pad is removably secured to that portion of the garment in which it is to operate, so that the pads may be readily removed when it is desired to launder or cleanse the garment or to renew a pad. To this end in the construction shown, each of the pads has secured to each conductor wire at one or both ends of the pad, the male element 40 of a special snap fastener which is adapted to cooperate with a female snap fastener element 41 secured to the desired portion of the garment. Each of these male elements 40 is firmly secured to the pad covering material 35 and has connected thereto one of the conductors 37, 38 or 39. The corresponding female element of the snap fastener may have a current supply wire secured thereto and leading from the current supply belt to be described. It will therefore be seen that the snap fasteners consisting of the elements 40 and 41 serve to hold the pads in place upon the garment and to supply current thereto.

Inside of the garment at some distance above the waist thereof, there is provided a current supply conductor belt 42 extending around the back of the garment and towards the front thereof. This belt is provided with the conductor wires 43 and 44 which are supplied with current by the plug-in terminal 44 located in the present instance, under the right arm. This plug-in terminal may be supplied with current by conductor wires, not shown, leading from the airplane battery or other source of electric energy.

The present garment is preferably provided with tab-like means 45 near the lower ends of the sleeves for supplying current to electrical heating elements, to be described, within the gloves 47, and similar tabs 48 are provided near the lower ends of the legs of the garment for supplying current to the electrically heated elements, to be described, within the shoes 49.

The wiring arrangement of the present suit for supplying electric current to all of the heating pads will now be described. The right chest pad 24 has secured to the portion 25 thereof below the heating sheet 34 the snap fastener elements 40 one of which is connected to the wire 37 and the other to the wire 38 and these elements are positioned to be snapped into the female elements 41 secured to the garment inside the pocket to hold the pad in the position in which it is shown in dotted lines in Fig. 1. This pad is also provided at its upper end with the element 40 connected to the wire 39.

The female elements of the snap fasteners 28 which serve merely to hold the pockets closed are exposed at the exterior of the garment, but the female elements 41 which are supplied with electric current are not exposed at the exterior of the garment but are secured to small pieces of fabric which are sewed to the inner face of the garment as at 60, or they are secured to the fabric strips 61 (see Fig. 4), which are sewed to the garment and enclose a conductor wire.

It will be noted that in the pads shown, the male elements 40 of the snap fasteners are secured at both ends of the pads. This is because the wires 37 and 38 of the pads serve not only [illegible] sheet 34 but also to conduct current [illegible] other electrically heated units. In the case of the chest pads 24 and 25 the snap fastener element at the upper end thereof serves to sup-

ply current to one wire of a sleeve pad and the other wire of such sleeve pad receives current in a similar manner from a back pad 26 or 27. These sleeve pads are provided at their upper ends with the elements 43 to receive current and at their lower ends with similar elements for supplying current to the tabs 45. The leg pads are similarly constructed to supply current to the leg tabs 48.

The glove 47 is shown in Fig. 10 as a lined glove having the heating elements placed between the lining 50 and outer material 50', and this outer material is partly broken away to show the finger heating elements 51 in full lines. Each element may be formed of conductive rubber sheet material having its marginal edges folded around wires 52 similar to that above described and substantially as shown in Fig. 8. In addition to the heating elements 51 for each finger and thumb, a wider heating element 53 is preferably provided in the front of the glove in the wrist area thereof. The finger heating elements 51 are shown as connected in series by the wires 52, and are connected to the snap fastener elements 41 upon the tab of the glove by the wires 54. The wrist heating element 53 is connected to these wires 54 by the wires 52. The finger heating elements 51 are cut away slightly at their upper ends, as shown, as this lessens the tendency of the wires to break due to flexing.

Each shoe 49 is provided with snap fastener elements 41 at the rear upper portion thereof, and to these elements 41 are secured the spaced conductor wires 55 which supply current to the conductive rubber heating material 56 which may be similar to that used in the gloves. This material 56 having the wires 55 secured to its side edges is shown as extending down the back of the shoe, along the sole and upwardly around the toes of the wearer to heat the corresponding portions of the foot.

The wiring arrangement of the entire garment is shown in Fig. 9 wherein current is supplied to the wires 43 and 44 of the belt 42 from the plug-in terminal 46.

The chest pads 24 and 25 receive current from this belt through the lead wires 52 and 53, and the back pads 26 and 27 receive current from the belt through similar lead wires 54 and 55. The sleeve pads receive current through the pads 24 and 26 and the lead wires 56 and 57 and supply current to the gloves. The leg pads receive current from the lead wires 52 and 53 and also from the wire 55 and supply current to the shoes through the wires 37 and 39.

The pad arrangement is such that each pad has three or more of the male snap fastener elements 40 secured thereto and connected to the conductor wires so that any pad may be readily secured in place in the garment and at the same time connected to the proper electrical connections by simply engaging these elements 40 with the corresponding female elements 41 secured to the garment. The various lead wires above mentioned are preferably covered with piping or other protecting fabric which is sewed to the inside of the garment as shown.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A garment having secured thereto an electrically heated sheet unit adapted to supply heat uniformly over a substantial surface area of the person wearing the garment, comprising a sheet carrying throughout its area a sufficient quantity of electrically conductive plastic composition to render such area conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors contacting said composition along a substantial length thereof whereby to cause a current to flow from one conductor to the other throughout said area when a different electric potential is maintained between said conductors.

2. An article of clothing having secured thereto an electrically heated sheet unit adapted to supply heat uniformly to a substantial surface area of the person wearing the clothing, comprising a sheet of textile fabric carrying a sufficient quantity of electrically conductive plastic composition to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors contacting said treated portion of the fabric along a substantial length thereof whereby to cause a current to flow from one conductor to the other throughout said area when a different electric potential is maintained between said conductors.

3. An article of clothing having secured thereto an electrically heated sheet unit adapted to supply heat uniformly to a substantial surface area of the person wearing the clothing, comprising a sheet of textile fabric carrying a sufficient quantity of electrically conductive plastic composition to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors having conductive edge portions of the fabric folded over and adhesively secured about substantial lengths of the conductors whereby to cause a current to flow from one conductor to the other throughout the conductive area of the fabric when a different electric potential is maintained between said conductors.

4. An article of clothing having secured thereto an electrically heated sheet unit adapted to supply heat uniformly to a substantial surface area of the person wearing the clothing, comprising a sheet of textile fabric coated substantially throughout with a conductive rubber composition to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors contacting said composition along a substantial portion of the fabric whereby to cause a current to flow from one conductor to the other throughout said area when a different electrical potential is maintained between said conductors.

5. An article of clothing having secured thereto an electrically heated sheet unit adapted to supply heat uniformly to a substantial surface area of the person wearing the clothing, comprising a sheet of textile fabric coated substantially throughout with a rubber composition containing sufficient current conductive carbon to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors contacting said composition along a substantial portion of the fabric whereby to cause a current to flow from one conductor to the other throughout said area when a different electrical potential is maintained between said conductors.

6. An article of clothing having secured thereto an electrically heated sheet unit adapted to

supply heat uniformly to a substantial surface area of the person wearing the clothing, comprising a sheet carrying over its area a plastic composition containing a sufficient amount of current conductive carbon to render said area conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors secured along a substantial portion of said conductive area whereby to cause current to flow from one conductor to the other throughout said area when a different electrical potential is maintained between said conductors.

7. An article of clothing having secured thereto an electrically heated sheet unit adapted to supply heat uniformly to a substantial surface area of the person wearing the clothing, comprising a sheet carrying over its area a plastic composition containing a sufficient amount of non-metallic current conductive particles to render said area conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, and spaced metal conductors secured along a substantial portion of said conductive area whereby to cause current to flow from one conductor to the other throughout said area when a different electrical potential is maintained between said conductors.

8. A garment having secured thereto an electrically heated pad adapted to supply heat uniformly to a substantial surface area of the person wearing the garment, comprising a textile sheet treated substantially throughout with a current conductive rubber to render the treated area conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, spaced metal conductors secured along a substantial length of said area to cause current to flow throughout said area when a different electric potential is maintained between said conductors, and said sheet being sandwiched between two covering sheets of fabric that are sewed to the conductive area of the central sheet.

9. A garment adapted to enclose a substantial portion of the body and provided with an electrically heated pad removably secured thereto to extend over the portion of the garment to be heated, comprising a sheet treated with a current conductive rubber to render the major portion of its area conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, spaced metal conductors secured along said area to cause current to flow throughout said area when a different electric potential is maintained between the conductors, and cooperating snap fastener elements secured to the pad and to the garment and to the metal conductors and adapted to retain the pad in place upon the garment and supply current thereto.

10. A garment adapted to enclose a substantial portion of the body and provided with an electrically heated pad removably secured thereto to extend over the portion of the garment to be heated, comprising a sheet treated with a current conductive rubber to render the major portion of its area conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, spaced metal conductors secured along said area to cause current to flow throughout said area when a different electric potential is maintained between the conductors, a protecting covering sheet of fabric secured to said pad, and cooperating snap fastener elements secured to the covering sheet and to the garment and also to the metal conductors and adapted to retain the pad in place upon the garment and supply current thereto.

11. A garment adapted to enclose a substantial portion of the body and provided with a pad large enough to heat a substantial portion of the garment and with a pocket adapted to receive the extended pad, said pad comprising a sheet treated with a current conductive rubber to render its area conductive and capable of liberating heat energy when generated therein by conversion of electric energy into heat, and spaced wires secured along said area to cause current to flow across said area when a different electric potential is maintained between said wires.

12. A body enclosing garment provided with electrically heated pads secured to different portions of the garment, each pad comprising a sheet treated with a current conductive rubber to render the treated area conductive and capable of liberating heat energy when generated therein by conversion of electric energy into heat, spaced wires secured along said area to cause current to flow throughout said area when a different electric potential is maintained between the wires, and a current supply conductor belt secured to the garment and provided with lead wires connecting the different pad wires to said belt.

13. An electrically heated glove having secured in the fingers thereof electrically heated sheet units, each unit comprising a sheet of fabric carrying a sufficient quantity of conductive rubber to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, spaced conductor wires secured to the rubberized portion of said fabric along its edges whereby to cause a current to flow from one wire to the other across said fabric to heat the same, and electrical connections for supplying current to said wires.

14. An electrically heated glove having secured in the fingers thereof electrically heated sheet units, each unit comprising a sheet of fabric carrying a sufficient quantity of conductive rubber to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, spaced conductor wires secured to the rubberized portion of said fabric along its edges whereby to cause a current to flow from one wire to the other across said fabric to heat the same, and electrical connections for connecting said units in series and for supplying current thereto.

15. An electrically heated glove provided with an area heating sheet unit secured thereto and comprising a sheet having a surface of electrically conductive plastic composition, and metal conductors extending along the opposite sides of the sheet to supply electric current thereto and cause current to flow across the sheet from one conductor to another to generate heat over its surface.

16. An electrically heated article of footwear provided with an area heating sheet unit secured thereto and comprising a sheet having a surface of electrically conductive plastic composition, and metal conductors extending along the opposite sides of the sheet to supply electric current thereto and cause current to flow across the

sheet from one conductor to another to generate heat over its surface.

17. An electrically heated shoe having secured therein an electrically heated sheet unit, comprising a sheet of fabric carrying a sufficient quantity of conductive rubber to render the fabric conductive and capable of liberating heat energy when generated therein by conversion of electrical energy into heat, spaced conductor wires secured to the rubberized portion of said fabric along its edges whereby to cause a current to flow from one wire to the other across said fabric to heat the same, and electrical connections for supplying current to said wires.

LOUIS MARICK.

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546,812 COMPLETE SPECIFICATION

SHEET 1

Fig. 1.

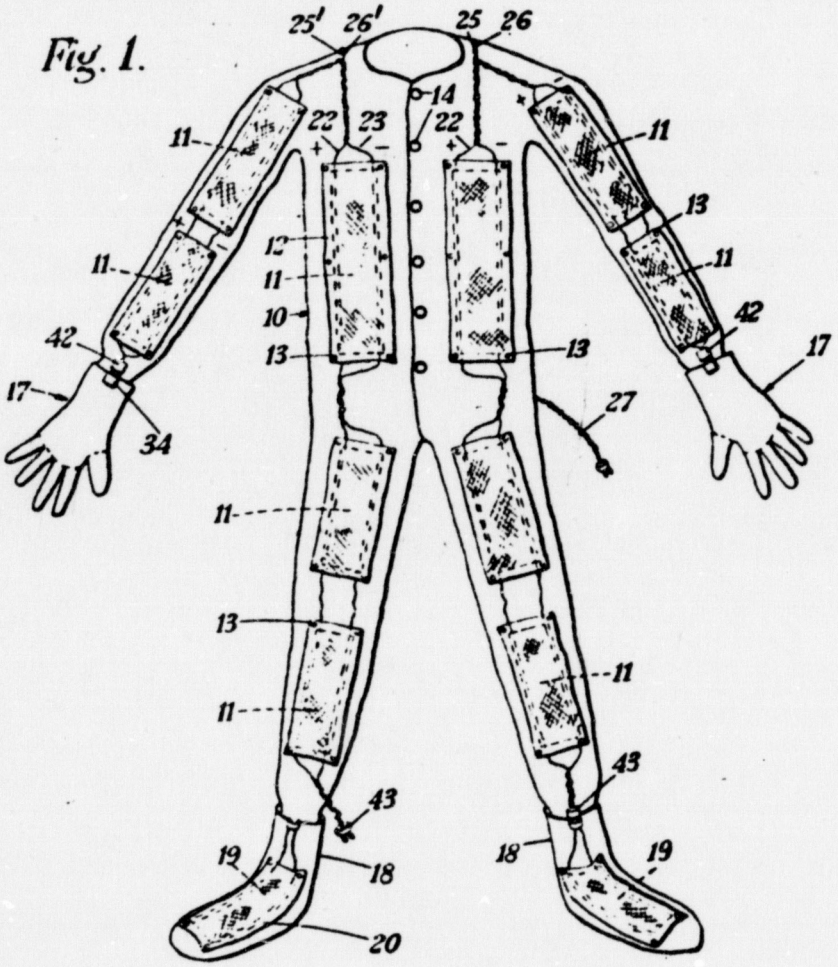
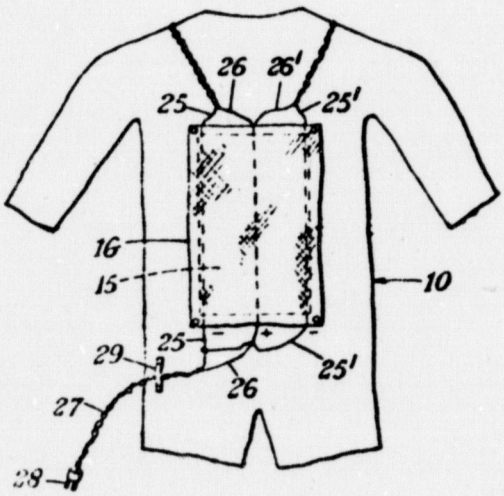


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

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SERIAL NO. 28-296
DATE 5-2-62

USCOMM-DC 50039-P65

12V

Fig. 3.

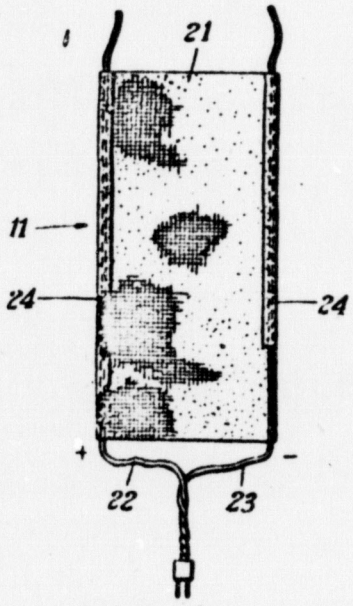
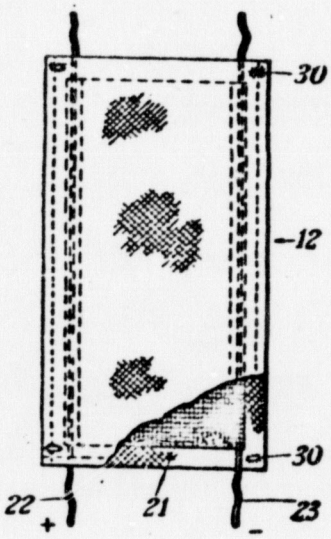


Fig. 4.



12V

Fig. 5.

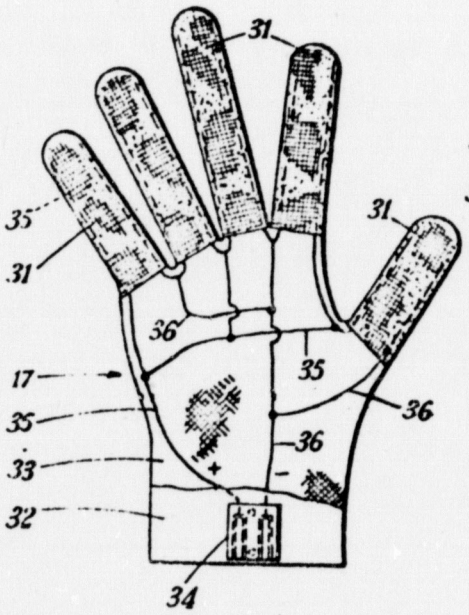
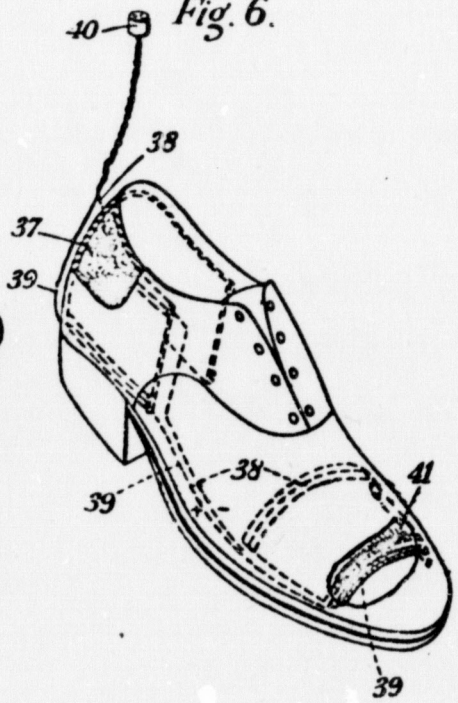


Fig. 6.



Malby & Sons, Photo-Litho

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EXAMINER'S COPY

PATENT SPECIFICATION

Convention Date (United States of America): Aug. 13, 1940. **546,812**

Application Date (in United Kingdom): Aug. 12, 1941. No. 10240/41.

Complete Specification Accepted: July 30, 1942.

COMPLETE SPECIFICATION

Improvements in Electrically Heated Wearing Apparel

We, UNITED STATES RUBBER COMPANY, a company organized and existing under the laws of the State of New Jersey, United States of America, having our registered office at Rockefeller Center, 1230, Sixth Avenue, New York, United States of America, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electrically heated wearing apparel such as electrically heated suits, underwear, footwear, gloves and the like, developed more particularly for use by pilots and other members of an airplane crew to protect them from the cold when flying at high altitudes.

Unless the pilot and other members of an airplane crew are protected from the extreme cold when flying at high altitudes they will not be able to handle efficiently the control levers and other apparatus essential to flying, and if thick clothing is relied upon for protection from the cold the bulkiness of the clothing may interfere seriously with the wearer's freedom of movement.

The present invention contemplates various types of wearing apparel such as outer garments, underclothing, shirts, socks, gloves and shoes having associated therewith thin, flexible sheet material forming light weight electric heating units that are permanently or removably secured to the portions of such garments it is desired to heat, to thereby heat these garments without appreciably increasing their weight or thickness and without making them stiff, bulky or uncomfortable.

The means employed in accordance with the present invention for heating such wearing apparel consists of one or more area heating units attached to one or more body and/or limb fitting portions of the article according to the nature thereof, each unit comprising a sheet of, or having a surface of, electrically conductor plastic composition, and metal conductors for supplying electric current to spaced portions of said sheets thereby to heat selected portions of the garment.

The electrical heating unit of the present invention may be no more bulky than an ordinary sheet of fabric and therefore can be readily secured to various portions of an undergarment or outer garment without interfering appreciably with the comfort or movements of the wearer of such garment. Furthermore, these units give an equal distribution of moderate heat over their surface without danger of burning the wearer or his clothing. They may be located in the front and in the back of the body portion of the garment and in the sleeve and leg portions thereof. They may also be located in footwear and in gloves, in which case the electrically heated conductors may be provided with conductor wires adapted to be removably connected to conductor wires extending from a source of electric energy along the legs and sleeve portions of the wearer's garment.

In the case of outer garments, shoes, gloves and the like that do not require to be laundered the heating units may be permanently secured between the outer material and the lining of such wearing apparel. In the case of undergarments, shirts and socks the heating units are preferably removably secured thereto by means of buttons or the like so that they may be removed when these garments are to be laundered. When these heating units are not located between the outer material and lining it may be desirable to mount them in a bag or pocket which will protect the conductive surfaces of these units from wear, and facilitate the securing of the units in place upon the garment.

The above and other features of the invention will be further understood from the following description when read in connection with the accompanying drawings illustrating good practical embodiments thereof.

In the drawings:—

Figure 1 is a view of the front portion of an undergarment such as a union suit that is electrically heated in accordance with the present invention;

Figure 2 is a rear view of the upper portion of the garment of Figure 1;

Figure 3 is a plan view on a larger scale

[Price 1/-]

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of one of the heating units of the present invention;

Figure 4 is a plan view showing the heating units of Figure 3 mounted in a protecting bag;

Figure 5 is a plan view with parts broken away of the back of a glove constructed in accordance with the present invention; and,

Figure 6 is a perspective view of a shoe having one heating unit mounted in the heel portion thereof and a second heating unit extending across the toe portion thereof.

The electrically heated wearing apparel of the present invention may be employed by various persons who are exposed to low temperatures and are stationed or seated near a source of electric energy suitably for electrically heating the unit herein contemplated, but as above stated the present invention has been developed more particularly for use by pilots and other members of an airplane crew.

The embodiment of the invention shown in Figure 1 of the drawing consists of an undergarment 10 of the union suit type having full length sleeves and legs, and to the outer surface of this union suit are secured any desired number of the electrically heated units 11. These units are shown as mounted within a protecting bag or pocket 12, adapted to be removably secured to the union suit by buttons 13, or snap fasteners or other means for removably attaching the bags in the desired position upon the suit 10.

In the construction shown in Figure 1, the heating units 11 are secured to the front portion of the garment at each side of the central row of buttons 14 in position to keep the chest of the wearer warm. Other units 11 are secured to the front portion of each leg of the garment over the wearer's thighs, and still other units 11 are secured to the front portions of the garment below the knees to keep the lower leg portions of the wearer warm. The front portion of each sleeve of the garment 10 is provided with a heating element 11 positioned above the elbow to keep the upper portion of the arm warm, and a second unit 11 is positioned below the elbow to keep the lower portion of the arm warm.

The union suit 10 in addition to having the ten heating units just described secured to the front portion thereof as shown in Figure 1 may also be provided with a wider heating unit 15 secured to the rear portion of the garment 10 as shown in Figure 2 in position to keep the back of the wearer warm. This wide heating unit 15 is shown as mounted in a protecting bag 16.

The present invention further contemplates a construction whereby the wearer's hands and feet may also be kept warm, through the employment of these thin lightweight electrically heated units which will not appreciably interfere with the wearer's freedom of movement or comfort.

To this end there is shown in Figure 1 the electrically heated gloves 17, the construction of which is shown more fully in Figure 5. In accordance with the disclosure of Figure 1 the feet of the wearer are kept warm by the socks 18 each of which is provided with an electrically heated unit 19 mounted within the protecting bag 20. These electric units 19 are shown as extending downwardly along the front portion of the socks from a position above the ankle to a position adjacent the toes, to keep the lower leg and foot warm.

Each of the above mentioned heating units may have the construction best shown in Figure 3 and may consist of a supporting sheet 21 which may be formed of woven cotton fabric or other textile material. This sheet 21 has deposited on one or both faces thereof any suitable plastic or binding material such for example as rubber having distributed therethrough a sufficient amount of carbon particles to form an electric conductor of the sheet 21. The degree of conductivity of this sheet between any two selected portions thereof may be as high or as low as desired depending upon the amount of carbon particles deposited thereupon. That is, the number of carbon particles in the coating material for the sheet 21 may be varied, or successive coats of such material may be deposited upon the sheet 21. The primary purpose of this sheet is to form a flexible support for the current conducting cement or rubber deposited thereupon. While a textile fabric is deemed preferably, the sheet 21 may be formed of an asbestos or glass fabric, or this sheet may be formed of rubber or other plastic sheet material which may contain the current conducting carbon particles.

One example of a good practical electrically conductive cement which may be used to coat the fabric heating element 21 is as follows:—

Rubber	100.
Conducting carbon black	85.
Zinc Oxide	15.
Antioxidant	.75
Accelerator	2.00
Deodorant	.10
Softener	7.00
Vulcanizing agent	75
Gasoline	1500.

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The current for heating the sheet 21 of Figure 3 may be supplied thereto by the electric conductors 22 and 23 comprising wires provided with a covering of insulating material except at the points where they are engaged by the fabric 21, this portion of the wires should be bare, but may be tinned to prevent deterioration of the copper conductors, caused by the rubber compositions contacting therewith. Each marginal edge of the sheet 21 preferably is folded over a conductors wire 22 or 23 as at 24 and cemented to the fabric 21 over the conductor wire.

Since the heating unit 15, at the back of the garment is about twice as wide, in the construction shown, as the heating units 11, the unit 15 is provided with three conductors wires as shown in Figure 2, instead of two conductors wires shown in Figures 1 and 3. In this heating unit 15, the wires 25 and 25' secured to the marginal edges of the unit should be of like potential energy such as negative conductors, whereas the central wires 26 may be a positive conductor.

In each of the heat units the conductive properties of the sheet 21, irrespective of the width of the same, should be just sufficient to raise the entire surface of the sheet to a temperature of about 90 to 130° F. as the current passes crossing the sheet from the positive to the negative wire conductor. Therefore if the heating unit is relatively narrow in width as for example in the fingers of the gloves 17, the conductivity of the sheet used in these glove fingers should be less than a wider sheet used for example in the suit 10. This however may be readily obtained by employing a sheet for the fingers of the glove having fewer carbon particles deposited thereon per square inch than in the sheet 21 of the heating unit 11.

In the embodiment of the invention shown in Figure 1 the electric current for heating all of the units of the union suit 10 and those of the gloves 17 and socks 18, is supplied by the conductor wires 27 leading from the waist of the garment to any suitable source of electric energy (not shown) such as an outlet plug adapted to receive the contacts 28. These conductor wires may pass through the strap 29 upon the garment 10, and when the heating apparatus is not being used the wearer of the garment may pull the contacts 28 out of the outlet plug and stick the wires 27 in his pocket.

In Figure 4 the heating unit 11 is shown as placed in the protecting bag or pocket 12, which bag may have the buttonholes 30 adapted to receive the buttons 13 on the garment.

The glove 17 is shown in Figure 5 as provided with the current conducting heating fabric 31 secured in the back of each finger. This fabric is preferably positioned between the outer fabric 32 of the glove and lining 33. The contact plug 34 for supplying current to the glove may be sewed or otherwise secured to the back of the glove as shown in Figure 5. Leading from this glove are provided the positive conductor wire 35 and negative conductor wire 36. The positive conductor wire 35 or a branch wire connected thereto extends along one marginal edge of each fabric 31, whereas the negative wire 36 or a branch wire connected thereto extends along the opposite marginal edge of each fabric 31 as shown. This will serve to heat the back portion of each finger and thumb of the glove. Other arrangements of the heating elements from that shown in Figure 5 may however be employed.

In the shoe shown in Figure 6 one heating fabric 37 is mounted in the heel portion of the shoe between the outer material and lining to extend around the counter portion of the shoe. Electric current is supplied to the upper marginal portion of this fabric by a wire 38 and to the lower marginal portion of the fabric by the wire 39, which wires may lead to the contact plug 40.

A second heating fabric 41 is shown as mounted in the fore part of the shoe between the lining and outer material to extend across the top of the foot, and current is supplied to this fabric by extending the wires 38 and 39 frontwardly in the shoe adjacent the sole thereof and then upwardly along the front and rear marginal edge respectively of this fabric.

Electric current may be supplied to all of the electrically heated wearing apparel shown by the abovementioned conductor wires 27, having the upwardly extending conductors 25, 25', 26 and 26' at the back of the garment 10. The wires 25 and 26 extend upwardly over the left shoulder of the garment, and a branch wire 26' and the wire 25 extend upwardly over the right shoulder. These wires supply current to the various conductor wires 22 and 23 at the front of the garment and which extend downwardly along each side of the front of the garment and along the sleeve as shown, to heat the sheets 11 that are connected in parallel across these wires. The wires 22 and 23 terminate at the bottom of the sleeves in the contact plugs 42, and at the bottom of the legs in the contact plugs 43. These plugs are adapted to be connected to the heating units above described for the hands and feet of the wearer.

Airplanes now in use frequently have a

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12 volt source of electric energy which is sufficient to heat the various units herein described to the desired temperature, and either direct or alternating current may be used.

While we have shown and described one embodiment of our invention, it is to be understood that the invention contemplates electrically heated wearing apparel in general, and that various modified forms of garments may include articles such as boots, overshoes, mittens, caps, helmets, ear-muffs, face-masks, and the like.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. An electrically heated article of wear of any of the classes described, said article having one or more area heating units attached to one or more body and/or limb fitting portions of the article according to the nature thereof, each unit comprising a sheet of, or having a surface of, electrically conductive plastic composition, and metal conductors for supplying electric current to spaced portions of said sheets thereby to heat selected portions of the garment.

2. An electrically heated garment according to claim 1, wherein the heating sheet comprises a woven fabric sheet while the electrically conductive surface composition contains conducting particles.

3. An electrically heated garment according to claim 2, wherein the conducting particles deposited on the fabric sheet are made of carbon.

4. An electrically heated garment according to claim 1, wherein the heating sheet consists of an asbestos or glass fabric, or rubber or other plastic material

5. An electrically heated garment according to any of claims 1—3, wherein the conductors are connected to opposite marginal portions of the heating sheets.

6. An electrically heated garment according to claim 5, wherein the marginal edges of the heating sheets are folded over the conductor wires and cemented to the sheet over said wires.

7. An electrically heated garment according to claims 2 and 3, wherein the fabric sheet has deposited thereon an electrically conductive rubber composition throughout which the carbon particles are deposited.

8. A washable garment provided with area heating units for different portions of the garment, means for removably securing said units in place upon the garment, each unit comprising a piece of thin non-metallic sheet material having a surface of electrically conductive plastic composition, and electric conductors for supplying electric current to spaced portions of said units to generate heat throughout the units.

9. An electrically heated article of clothing having an outer wear surface and lining, a heating unit mounted between said outer wear surface and lining comprising a sheet having a surface of electrically conductive plastic composition, and metal conductors for supplying electric current to spaced portions of said sheet to heat the same.

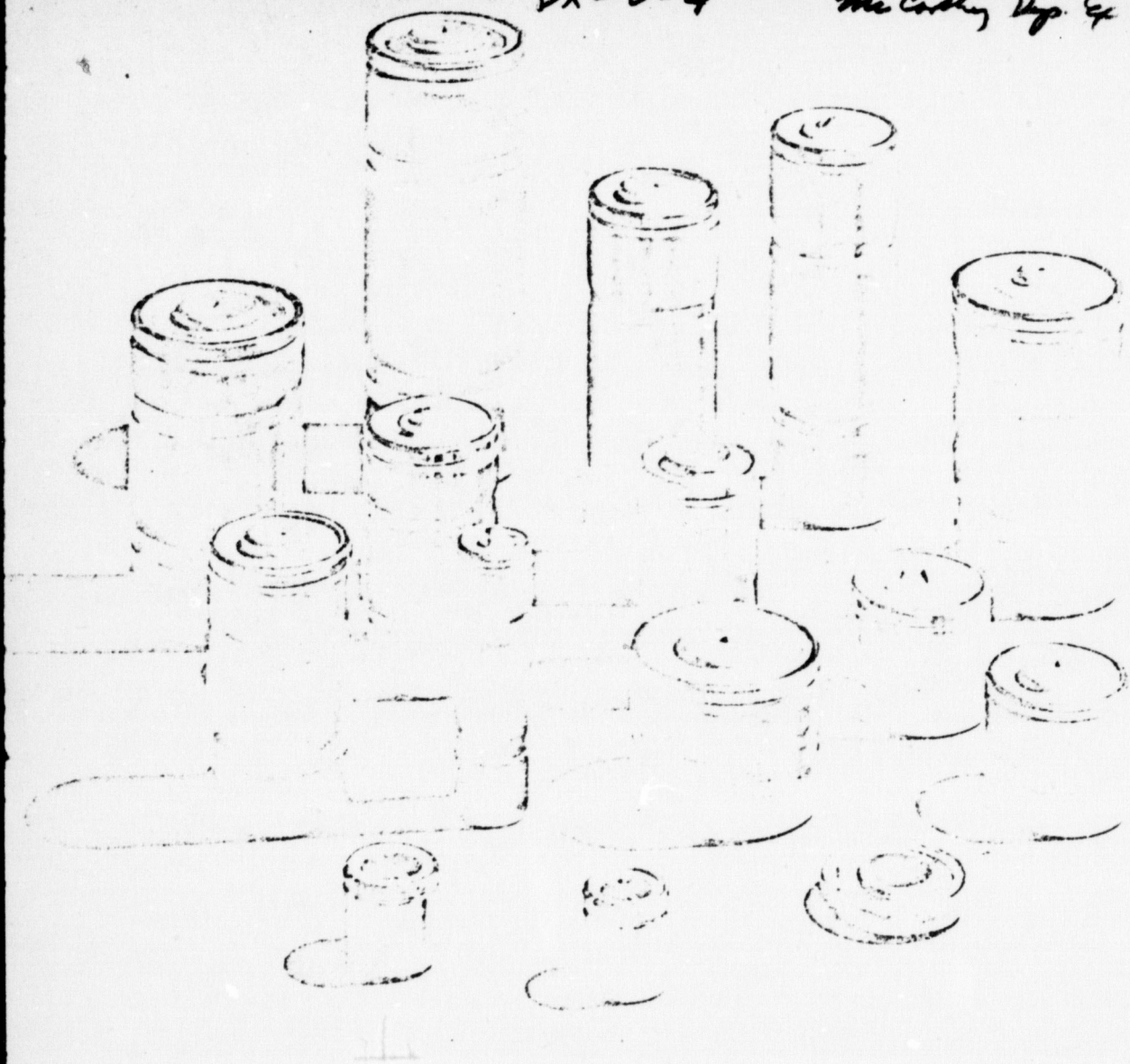
10. An electrically heated article of wear substantially as hereinbefore described and illustrated in the accompanying drawings.

Dated this 10th day of July, 1942.

T. A. CLAYTON,
Acting for Applicants.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1942.

DX-0-4 McCarthy Dep Ex 4



chargeable, nickel-cadmium batteries are available in wide range of sizes and shapes. Cells can be combined to supply various power needs.

Cordless Battery Power

Portable power offers many possibilities for new appliances

by Robert J. McCarthy, Assistant Products Manager of the Battery Division, Sonotone Corp.

THE ERA of portable, cordless power has become a reality. Products already removed from the limitations of an electrical cord range from toothbrushes to power tools. All this has been made possible by the development of miniature, rechargeable battery cells of the sintered-plate, nickel-cadmium type.

Appliances now using rechargeable nickel-cadmium batteries for portable, cordless power include: food mixers, hedge trimmers, radios, power drills, shavers and toothbrushes. Some other cordless appliances now on the drawing boards are: vacuum cleaners, ice crushers, can openers, rotisseries, heating pads, blenders and sanders.

The sintered-plate type of nickel-cadmium battery can be recharged hundreds of times and discharged at extremely high currents while maintaining a steady voltage. It can be recharged by a simple half-wave transformer rectifier charger. It can be left on the recommended charge rate indefinitely without damaging the battery.

A nickel-cadmium battery is made up of one or more cells connected in series.

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Reprinted from Appliance Manufacturer magazine.

Characteristics of nickel-cadium cells

Construction details of an individual cell are shown in Fig. I.

Preparation of positive and negative plates requires the sintering of a fine nickel powder to a woven nickel wire screen. This results in a thin, highly porous nickel plaque. The plaque is then impregnated with nickel salt solutions for the positive plate and cadmium salt solutions for the negative plate. The separator, a treated absorbent cellulosic, similar to a high grade paper, mechanically separates the positive plate from the negative plate. It also holds an electrolyte, such as a 30 percent aqueous solution of potassium hydroxide, which permits ions, or electrical current, to flow between the plates.

The usual cell container is a nickel-plated steel can and cover. The cell assembly is made by rolling a positive and negative plate, separated by the cellulosic separator, into a tight roll or core. The core is placed in the can. The negative plate tab is welded to the bottom of the can, making the cell case the negative terminal. The necessary insulators and sealing gaskets are inserted into the open cell case. The cover, which has been welded to the positive tab, is placed in position. The cell is sealed after electrolyte is added.

The voltage of a sintered-plate, nickel-cadmium sealed cell is generally considered to be 1.25 volts per cell. This will vary slightly, however, depending on whether the measurement is taken on open circuit or under various loads. It is to be noted that the higher rates of drain tend to lower the voltage slightly (Fig II). As shown by the curves, capacity will also vary somewhat, depending on the rate at which you desire to use the stored energy. The slower the energy is used, the more will be available.

Ampere-hour capacity is generally measured to a 1.0 volt-per-cell endpoint and is the product of discharge current and time under load. In many cases, a higher endpoint can be used because most of the capacity in the sintered-plate cell is exhausted at a higher voltage level, usually about 1.15 volts. As shown in Fig. III, the cells hold a plateau voltage of about 1.2 volts per cell, then drop rather sharply near the end of discharge. This type of discharge differs radically from the standard dry cell where cell

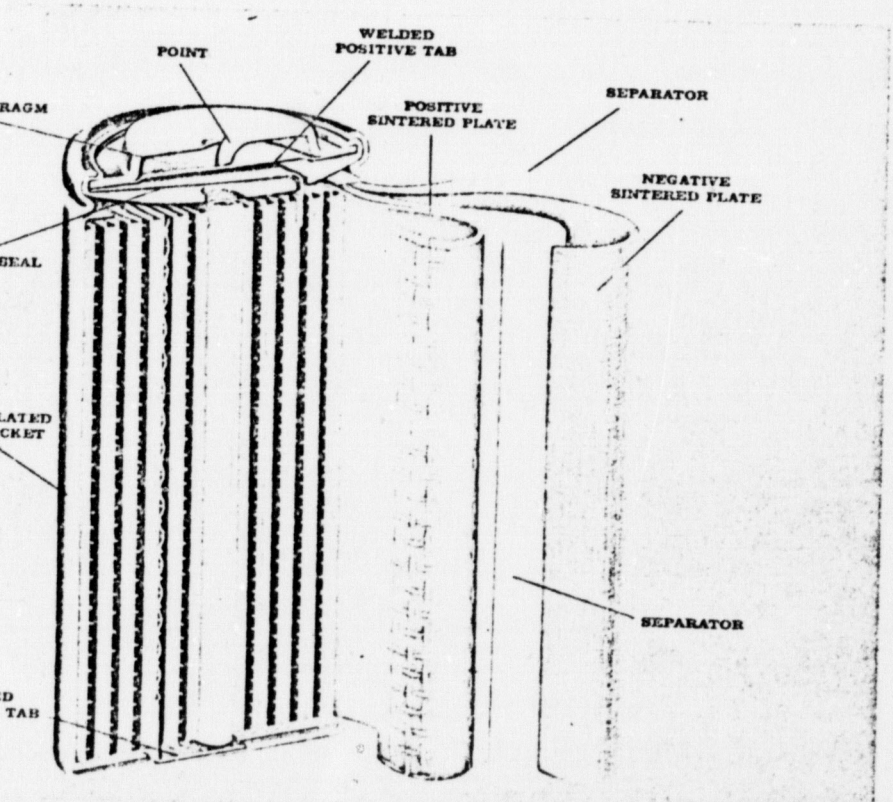


FIG. I. CUTAWAY of a battery cell. Plates and cellulosic separator are rolled into a tight core and placed in jacket. The negative plate tab is welded to bottom of jacket and cover, right, to the positive tab. The cell is sealed after the electrolyte has been added.

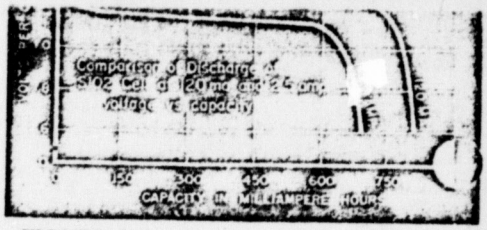


FIGURE II.

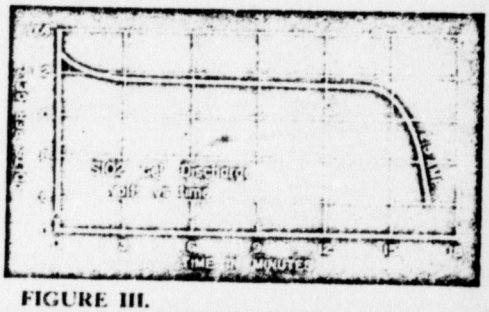


FIGURE III.

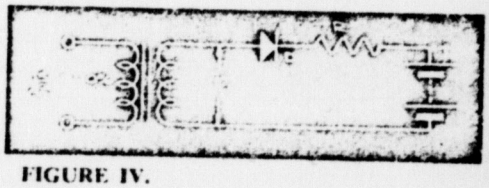


FIGURE IV.

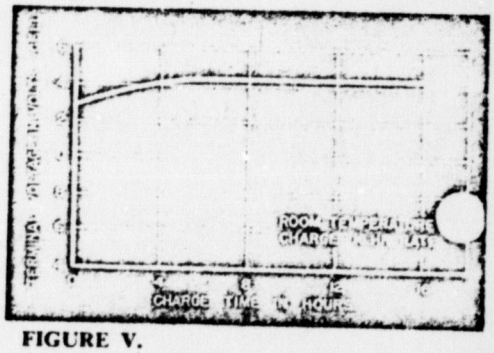


FIGURE V.

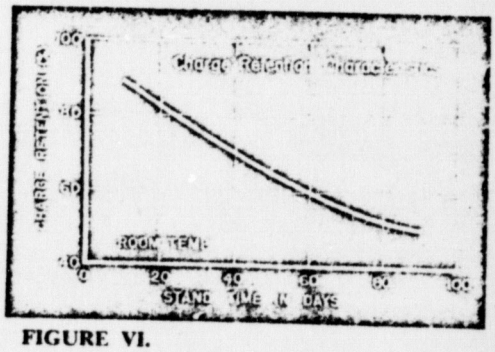
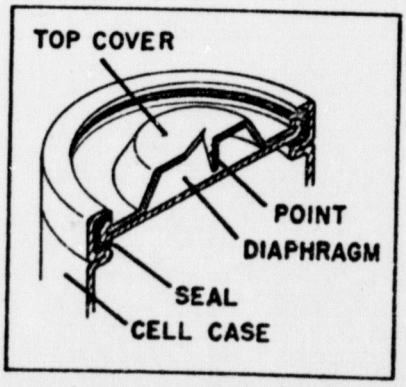


FIGURE VI.



decays almost in a straight line
n with time.
ed cells should be charged at a 14
hour rate under constant current
ons. Either dc or rectified ac may
l. Charge current should not exceed
anufacturer's recommendation. A
charging circuit is shown in Fig.
e minimum supply voltage is:

Minimum $E_s = 3n$ volts

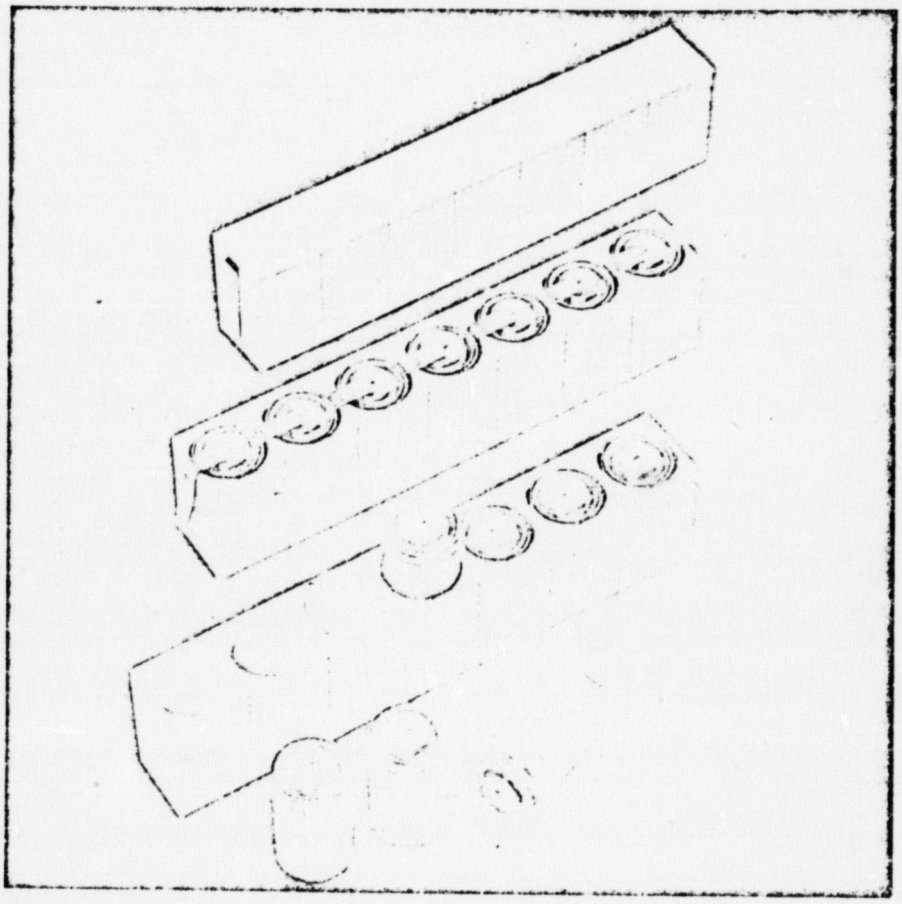
re:

$_s$ = Secondary voltage of transformer (RMS supply voltage)
= Number of cells in series

pply voltage higher than this mini-
value may be used if this is con-
and if the consequent increase in
istor (R) is not objectionable. The
of the series resistance (R) should
usted to limit the charging current
value I, recommended by the manu-
r. When making the resistor adjust-
the primary voltage should be held
115-volt nominal ac value. During
g at the above rate, a sealed, sin-
late, nickel-cadmium cell will have
ge pattern as shown in Fig. V. The
shows that shortly after a cell is
on constant current charge, it has
ge of 1.40 volts. This voltage can
s high as 1.45 volts per cell, and,
cases, slightly higher. The average
about 1.43 volts. Too low a voltage
dicate incomplete charging. Too
voltage may indicate too high a
rate. Experience has indicated that
d, sintered-plate, nickel-cadmium
n be left on charge at a 14-hr
rate or lower continuously.

all electrochemical storage devices,
aled nickel-cadmium cell loses a
age of its charge while in storage.
mount of loss is dependent upon
mbient storage temperature; the
the storage temperature, the faster
will lose its charge. Lower storage
atures will decrease this capacity

FIG. VIII. CELLS can be assembled various ways to meet the specific configuration and power requirements of an appliance design

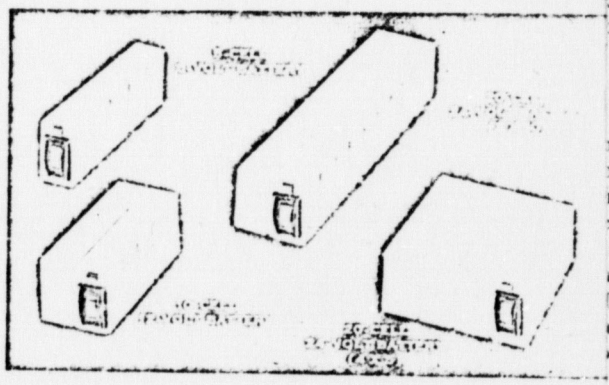


loss. At room temperature, the cell will retain 75 percent of its capacity after a 30-day stand and 50 percent of its capacity after 90 days (Fig. VI). In either case, the loss of charge is of a temporary nature and can be regained on subsequent charging. This is one of the advantages of a rechargeable system over the ordinary dry cell. Loss of shelf life can be prevented by retaining the cells on constant charge of the type described earlier.

It is difficult to be specific about the cycle life of a nickel-cadmium battery because of the varied applications and environmental conditions. We speak of life in terms of hundreds and thousands of cycles. A sealed nickel-cadmium battery will generally outlive the item it is used in.

Batteries consist of one or more cells connected in series. In most cases, nickel-cadmium cells used individually may require an insulating sleeve. However, they do not require any special packaging.

When two or more cells are connected in series to form a battery, packaging becomes a consideration. Packaging can be an integral part of the appliance where the configuration necessary to hold the required number of individual cells is



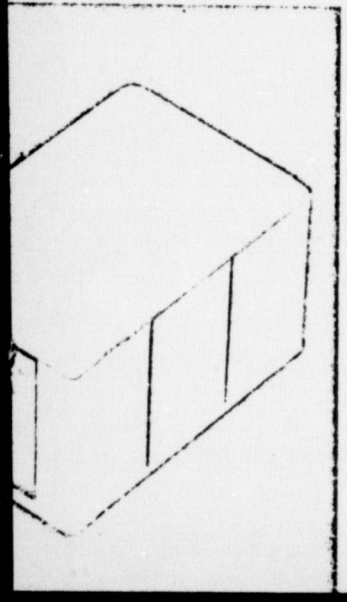
fabricated into the appliance housing. In this case, connecting cells in series would be done at the same time as the appliance is assembled.

Economics would be a consideration because separate cells cost less than an assembled battery. On the other hand, the battery supplier is more qualified to assemble a battery and has the necessary equipment for a low cost, high quality job.

Battery manufacturers offer many types of packaging. These range from a stainless steel can, with potted in cells, to an inexpensive assembly in which cells are

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L. SIX CELL battery held together inkable plastic film. Package is 2 x 3 . A cell is about 1½ x 1½ x 2½ in.



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Cells can be grouped to satisfy power need

held together with shrinkable plastic film. Figures VI and VII show the construction details of one type of battery package and the various configurations possible.

Various battery combinations can be used to supply any given power requirement. If a specific minimum job must be done, it can generally be stated in terms of so many watts of power for a certain period of time. Batteries that might be used to satisfy various wattages for 10, 20 and 40 min are tabulated in Fig. IX.

Improvements in the cordless power field are expected from a number of areas. Battery manufacturers are constantly striving to improve batteries. A battery of more capacity will allow more work to be done by the same size package. It will also permit use of a smaller, lighter battery to do the same job. The greatest improvement in cordless power seems to come from designing items that use the electrical energy more efficiently.

In the past, little thought had to be given to the efficient use of energy. An inexhaustable cheap source was available in nearly every home, shop, office, garage and barn in the form of an electrical outlet. Cordless power, on the other hand, makes power efficiency paramount. The efficient use of power allows the use of smaller and lighter batteries or allows more operating time. Designing with power efficiency as a main consideration will allow, in some cases, the same job to be done on one-third, or even one-fourth, the power previously required.

Hope to Increase Charge Rate

Another area where improvement may be forthcoming is in the rechargeability of sealed, nickel-cadmium cells. Battery manufacturers, as well as others, are constantly making efforts to increase the safe charge rate from the present 14-hours to the 7, 4 and even 1 hour rate. The importance of such a breakthrough most certainly will reflect itself in the use of smaller and lighter batteries.

Many cordless items under development were conceived many years ago but proved impractical at the time because batteries available would not function satisfactorily under high current drains. The sealed nickel-cadmium battery seems to be the solution to the power requirement. As a result, many ideas and designs may be obtained by reviewing old company records, designs and patents. With a little luck, you may discover the next item to sweep the industry.

Good hunting!

Typical sealed nickel-cadmium cells available are covered in the following list:

MODEL	SIZE	NOMINAL CAPACITY IN MAH	CHARGE RATE IN MA	DIMENSIONS (in inches)		WEIGHT IN OUNCES
				DIAMETER ±.010	HEIGHT ±.015	
S-101[B]	AA	510	50	.580	1.985	0.8
S-102	½C	810	80	1.022	.920	1.2
S-103[B]	D	4000	400	1.333	2.385	5.5
S-104[B]	C	1900	190	1.022	1.925	2.6
S-105[A]	Disc	140	15	1.000	.250	0.4
S-106[AB]	CD	3000	300	1.000	3.060	4.0
S-108	F	5600	560	1.333	3.455	8.3
S-113[A]	⅜ x 1⅜	1400	140	.865	1.650	1.8
S-114[A]	⅓C	440	44	1.000	590	.78
S-115[A]	1¼ x .7	800	80	1.242	.700	1.4
S-116[A]	⅓AA	130	15	.560	.615	.25
S-121[A]	1¼ x 1	1400	140	1.242	1.045	2.5
S-126[A]	625 x .6	170	20	.630	.620	0.4

[A] Without label and jacket. [B] With Positive contact button.

FIGURE IX.

Suggested Battery Configurations*

Number and Type of Sonotone Cells Needed

Wattage	40-Minutes of Operation Required
1	1—S-102
2	1—S-113; 2—S-102
5	4—S-102; 3—S-113; 1—S-103
10	1—S-108; 8—S-102; 5—S-113; 2—S-103; 3—S-104
25	3—S-108; 8—S-104; 4—S-103
50	5—S-108; 8—S-103
100	10—S-108
Wattage	**20-Minute Operation**
1	1—S-102
2	1—S-102
5	1—S-113
10	1—S-103; 2—S-104; 3—S-113
25	8—S-113; 5—S-104
50	3—S-108; 10—S-104; 5—S-103
100	5—S-108; 10—S-103
Wattage	**10-Minute Operation**
1	1—S-102
2	1—S-102
5	1—S-113
10	1—S-104; 2—S-113; 3—S-102
25	4—S-113; 3—S-104
50	8—S-113; 5—S-104
100	10—S-104; 5—S-103; 3—S-108

*A typical battery nomenclature would be 4—S-104, indicating four S-104 cells connected in series.

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ELECTRICALLY HEATED CLOTHING AND EQUIPMENT

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Fig. 3.

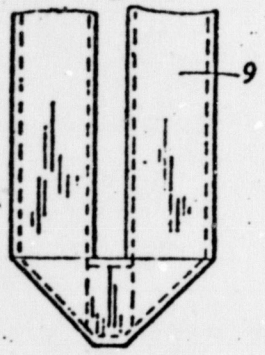


Fig. 1.

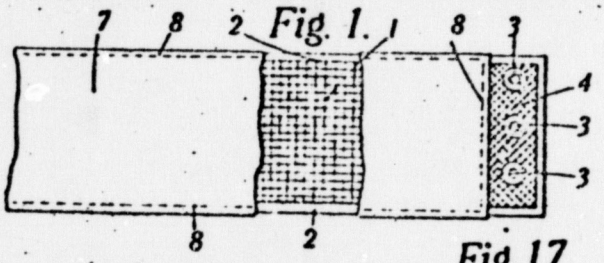


Fig. 17.

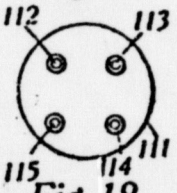


Fig. 2.

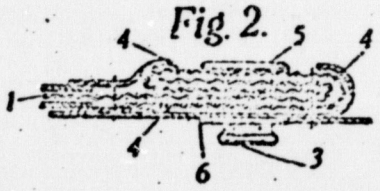


Fig. 7.

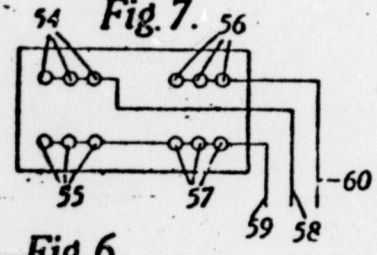


Fig. 18.

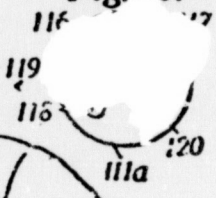


Fig. 4.

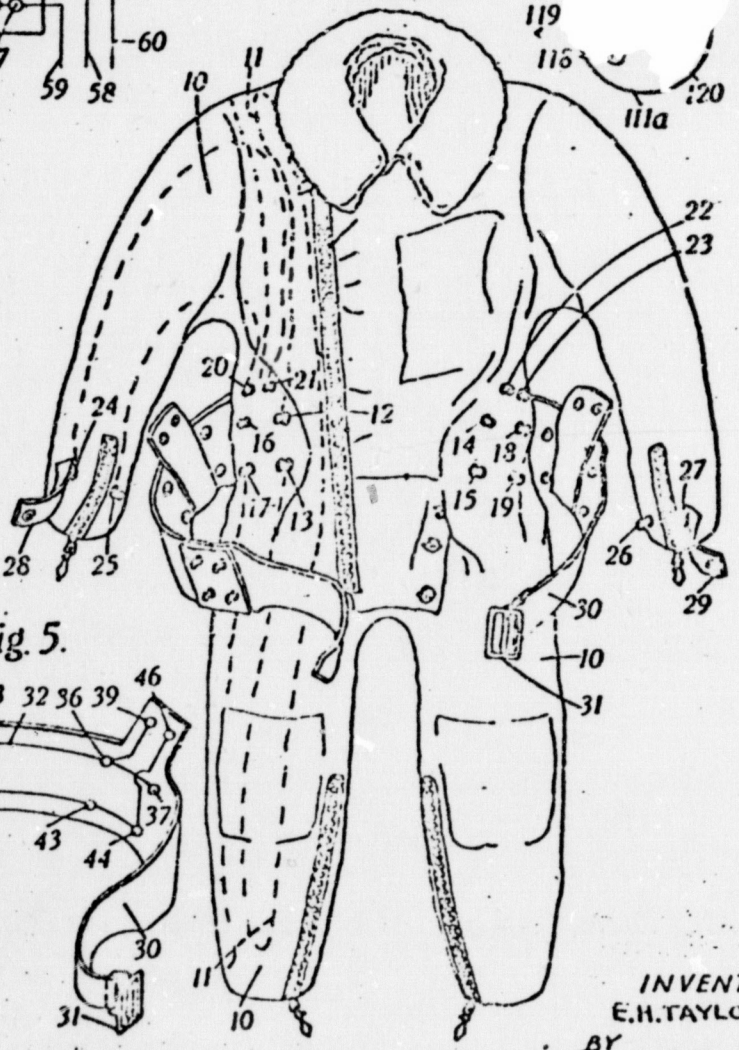


Fig. 6.

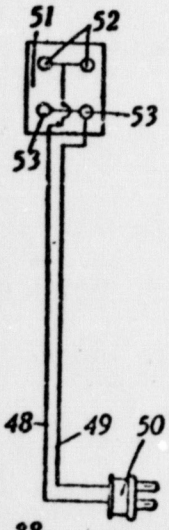
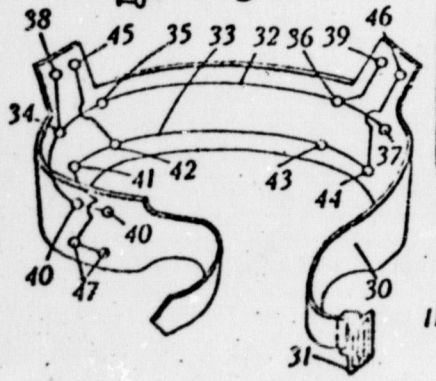


Fig. 5.



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BY
Blair + Kilcoyne
ATTORNEYS

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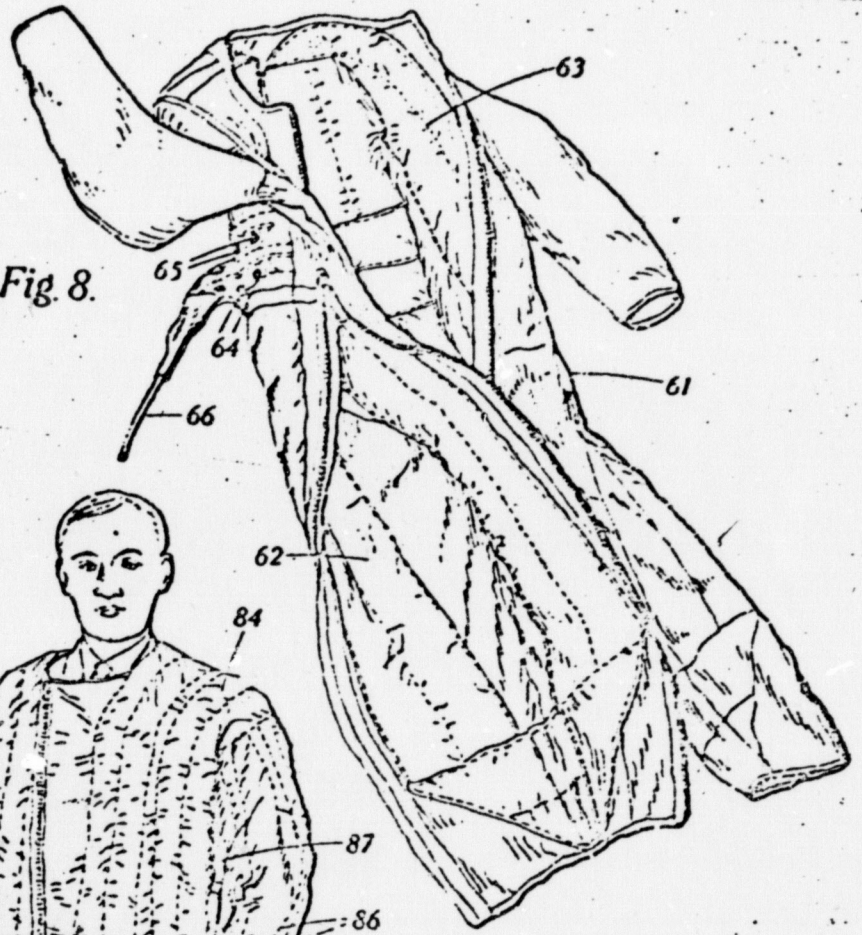


Fig. 8.

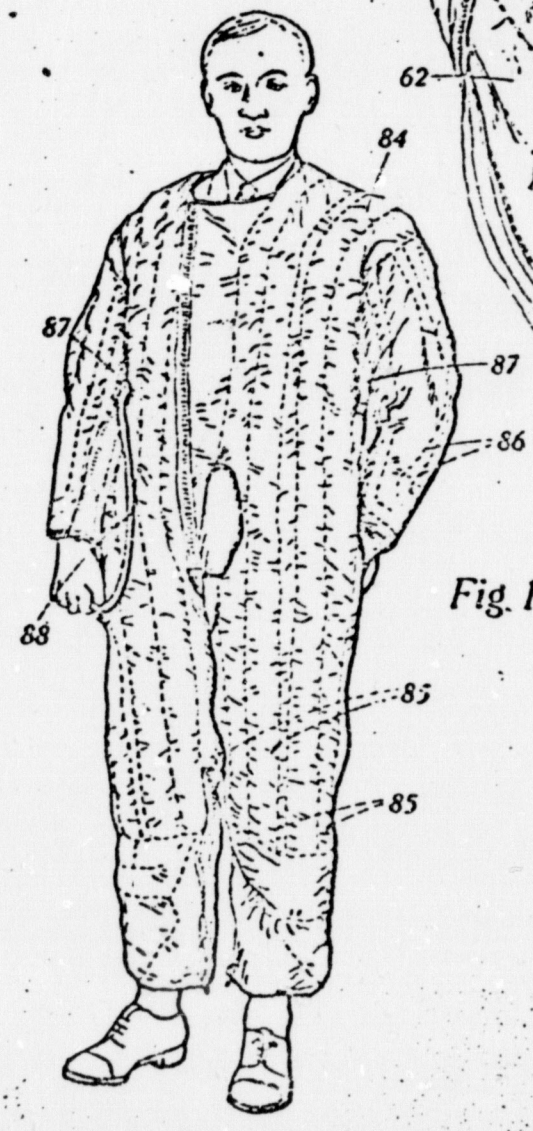


Fig. 12.

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Fig. 9.

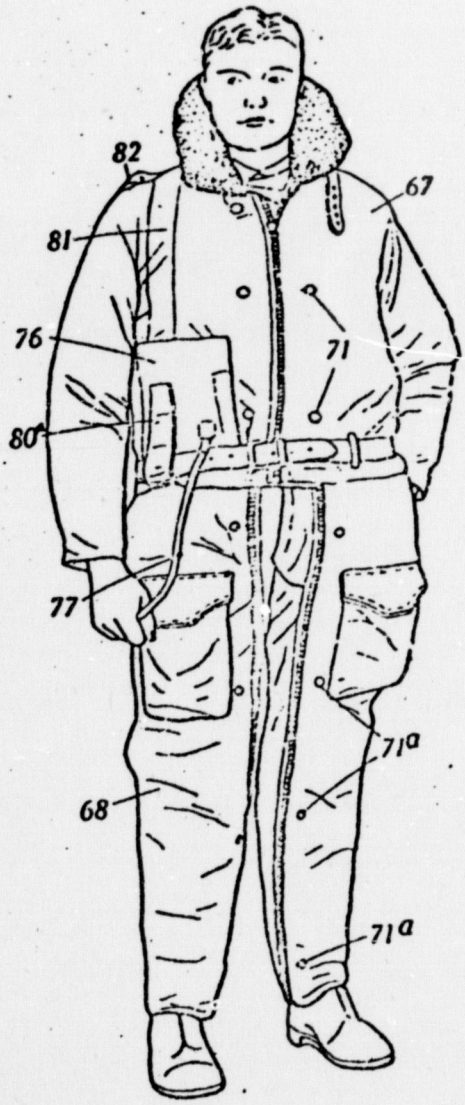
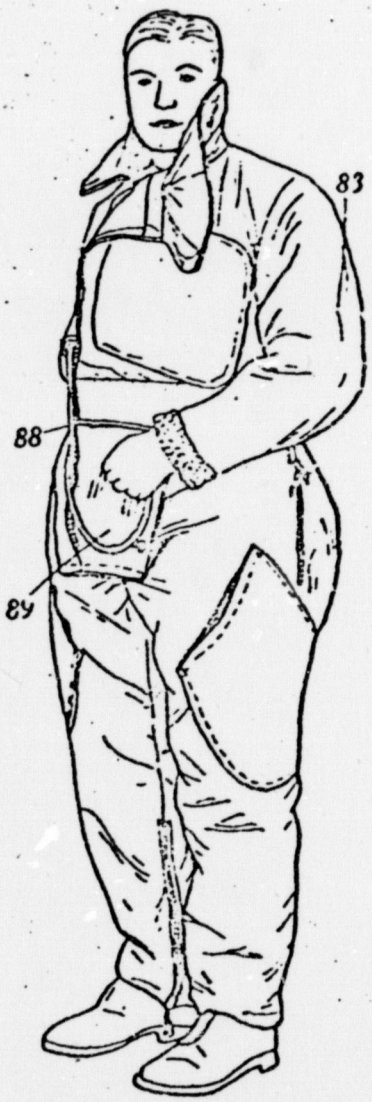


Fig. 13.



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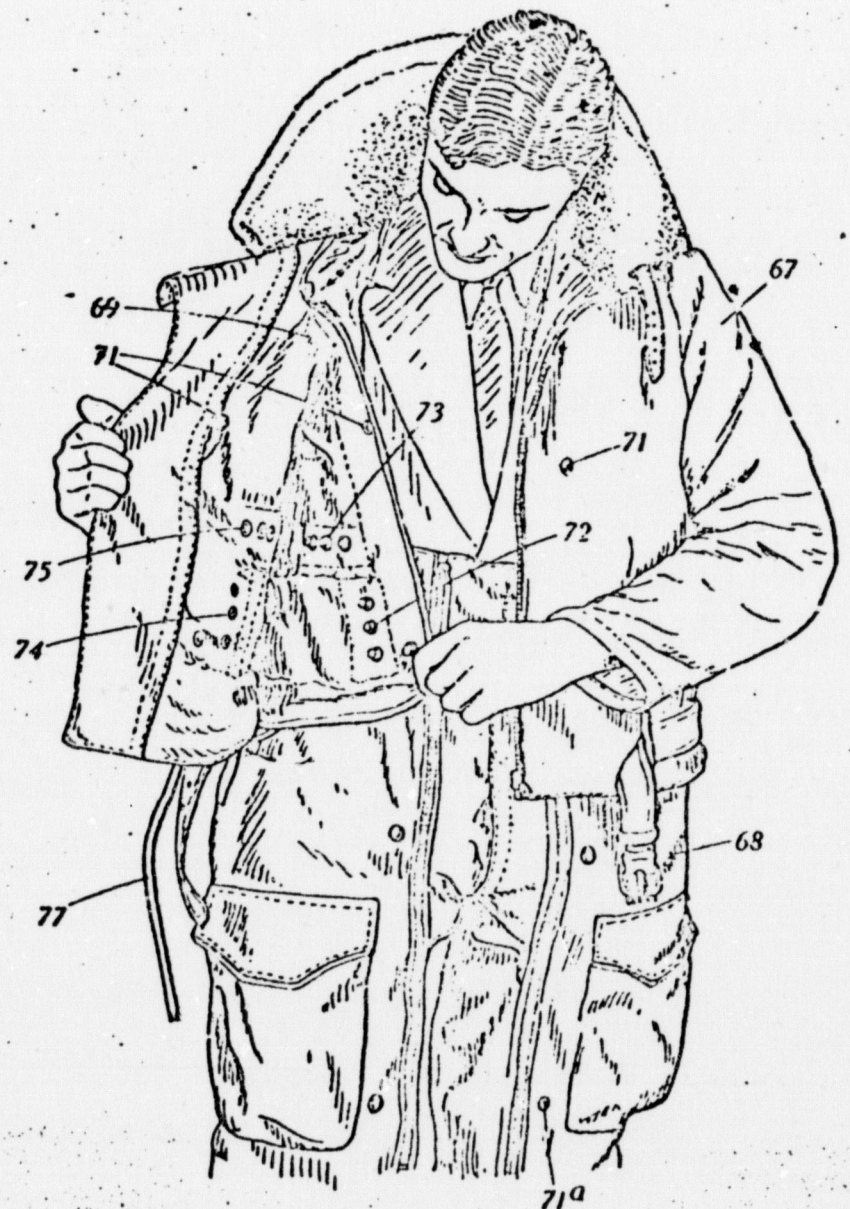
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Fig. 10.



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June 30, 1942. E. H. TAYLOR 2,287,915

ELECTRICALLY HEATED CLOTHING AND EQUIPMENT

Filed Dec. 11, 1940 6 Sheets-Sheet 5

Fig. 11.



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ELECTRICALLY HEATED CLOTHING AND EQUIPMENT

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Fig. 14.

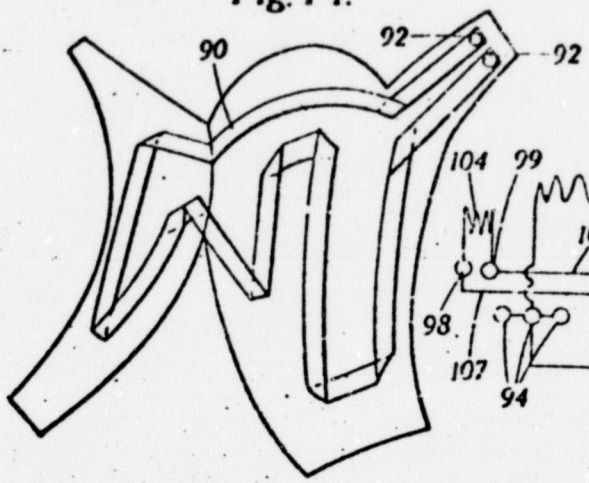


Fig. 16.

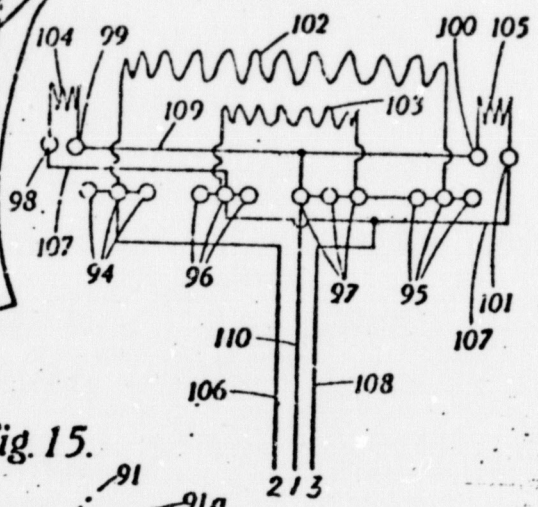
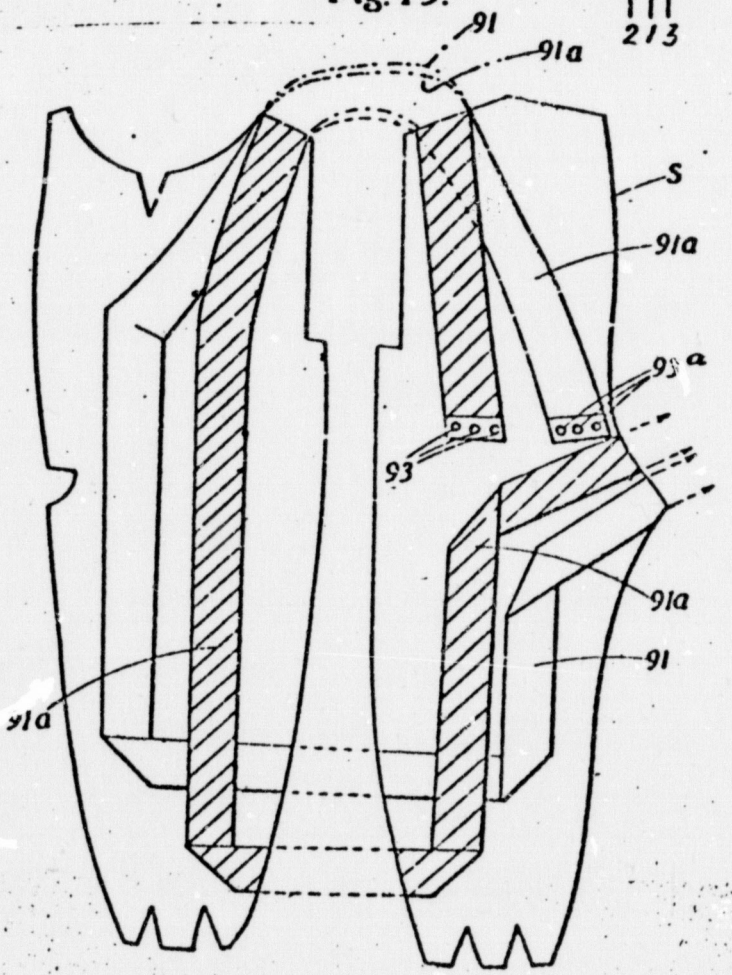


Fig. 15.



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Patented June 30, 1942 2,287,915

UNITED STATES PATENT OFFICE

2,287,915

ELECTRICALLY HEATED CLOTHING AND EQUIPMENT

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Application December 11, 1940, Serial No. 369,666
In Great Britain March 4, 1940

13 Claims. (Cl. 219—46)

This invention relates to improvements in electrically heated clothing such as suits, gloves, socks, boots or the like and other equipment such as heater pads, blankets, muffs, coverings or the like.

Electrically heated clothing and equipment are already known, the known method involving the use of electric resistance elements in the form of wires. This known method is open to numerous objections amongst which may be mentioned the small area of heat dissipation pertaining to each element and the resultant necessity for employing high local temperatures if appreciable heating is required and the consequent danger of burning or scorching the article or anything in contact with it. It will also be appreciated that quite apart from these difficulties even the use of high temperature elements does not result in a substantially uniformly heated area but merely in an area which has a number of spaced lines at high temperature.

A further and very serious difficulty encountered in known electrically heated equipment resides in the tendency for the elements to break if they are incorporated in flexible articles and in any event it is difficult to make satisfactory connections with a current supply source because these after relatively short periods of use tend to break away from the wire resistance elements.

One of the objects of the present invention is to provide electrically heated clothing and equipment wherein the above-mentioned difficulties and objections are entirely met and a further object is to provide a very simple, inexpensive and efficient mode of achieving the desired degree of heating.

A further object of the present invention is to provide an electrical resistance heating element comprising gauze, for instance, in strip form, made from conducting material.

A still further object of the present invention is to provide an electrical resistance heating element comprising gauze and connectors in the form of press stud fasteners secured to said gauze and adapted to co-operate with complementary parts secured to other resistance elements or to a current supply source.

Yet another object of the present invention is to provide an article of clothing such as a suit, glove, sock, boot or the like or other electrically heated equipment such as a heater pad, blanket, muff, covering or the like incorporating one or more electrical resistance heating elements comprising strips of gauze made from conducting material.

A still further object of the present invention is to provide an article of clothing such as a suit, glove, sock, boot or the like or other electrically heated equipment such as a heater pad, blanket, muff, covering or the like incorporating electrical resistance heating elements made from wire gauze and press stud fasteners whereby said elements may be detachably interconnected and connected to a current supply source.

With the above and other objects in view which will become apparent from the following specification the present invention resides in the features hereinafter set forth and claimed in the appended claims.

It will be understood that the present invention is applicable to a very wide range of articles such for instance as wearing apparel such as suits, gloves, socks, boots or the like, and heater pads, heater linings, blankets, muffs, coverings or the like and for convenience the expression "electrically heated equipment" as used in the following specification and in the appended claims is intended to cover all of such articles.

It is also to be understood that the term "gauze" as used herein is intended to cover any suitable form of gauze, mesh, net or the like.

I find that very great advantages result from the use of gauze in the production of electrical resistance heating elements and in the use of such elements in electrically heated equipment. Thus such material can be readily cut or formed to any desired shape or dimensions and easily adapted for any desired current supply and wattage dissipation. Moreover, such material is readily adapted for flexing without breakage and even if some of the wires or strands become fractured the efficacy of the element need not become materially impaired owing to the large number of conductors present.

The use of wire gauze also gives a large heating area as opposed to the mere line heating of an ordinary resistance element and it can be stitched, for example with an ordinary sewing machine, into position in clothing or like equipment. This latter feature is of very great importance from the point of view of quick and inexpensive production as the heating system can for instance be incorporated by the actual manufacturer of an article of clothing and with the equipment ordinarily used for the manufacture of such clothing.

According to yet another feature of the present invention I employ electrical connectors in the

form of press studs for making connection between the aforesaid gauze heater elements and/or between a gauze heater element and a current supply source. In this way connection and disconnection can be made easily and quickly, and moreover, the fitting of the press stud components to the clothing or equipment concerned is again one which can easily be carried out by the manufacturer of such clothing or equipment.

The aforesaid gauze heater elements can easily be stitched for instance to a fabric base so that they lie flat thereon and I find that there is very little if any tendency for strands of the gauze to cut through the fabric. When employing ordinary resistance wires however, there is a serious tendency for the wires to cut through a fabric base and in any event appreciable bulges are formed where the wires are located.

In cases where gauze heater elements are to be secured together and it is not desired to provide for easy disconnection of such elements then instead of employing the above mentioned press-stud connectors the elements may be directly secured together. Owing to the large areas presented the electrical interconnection of the elements can be easily and quickly secured by directly splicing them together or by folding the ends together and then stitching the overlapped or interlocked parts with any suitable thread or wire.

The aforesaid gauze heater elements may be made of any suitable metal such for example as stainless steel, nickel-chrome or tinned iron and for the purpose of ensuring good surface contact at the points where connections are made, for instance, with the aforesaid press-studs, a strip of high conductivity material, such as copper gauze may be wrapped around the appropriate part of the heater element or such part of the element may be wrapped around the gauze. In this way any possibility of unduly high local heating is reduced and the assembly is mechanically reinforced at the points of connection.

The aforesaid gauze heater element may be made of any desired mesh and from wire of any desired size. In many cases, however, wire of 43 S. W. G. made into a mesh of 60 x 50 wires per square inch is suitable.

In cases where it is desired permanently to connect current supply leads to a heater element then in place of employing connectors in the form of press-studs use may be made of rivets, for instance, resembling bifurcated paper fasteners, the heads of such rivets being relatively large so that they make large areas of contact with the gauze.

Heater elements according to the present invention can be disposed over substantially the whole area of an article to be heated and at the same time the wattage distribution can be designed for any desired value. Thus, a given area can be covered with only very small intervening spaces between the elements either by using a relatively short length of wide gauze or a relatively long length of narrow gauze, the former arrangement dissipating a relatively high wattage and the latter a relatively low one. The elements can, of course, be zig-zagged over any desired area in order to accommodate the desired lengths of elements and the flexible nature of such elements permits of their being easily folded into this disposition.

The heater elements employed in carrying out the present invention are preferably enclosed in cloth channels or the like as this facilitates handling of the elements and also prevents local short circuits which might otherwise arise when the device is folded.

When employing press-stud connectors in carrying out the present invention, it is preferable to employ a plurality of studs for each connection so as to reduce the possibility of inadvertent disconnection and the possibility of local heating such as may occasionally arise from bad connection at any particular press-stud. In some cases it is desirable to employ sufficient press-studs to ensure that each stud is only called upon to pass a current not exceeding 1½ to 2 amperes.

Heating means according to the present invention may be applied to various articles such as foot muffs, camera muffs and the like and they are particularly applicable to articles of clothing such as aviators' suits, gloves, socks, boots and the like.

In order that the present invention may be well understood some embodiments of heater elements and of their application to specific articles will now be described by way of examples and with reference to the accompanying drawings in which:

Figure 1 shows in broken plan view one form of element fitted with press-stud connectors and enclosed within a cloth channel.

Figure 2 is a side elevation of Figure 1,

Figure 3 shows how an element may be folded to assume a zig-zag disposition,

Figure 4 shows in front elevation one form of aviator's suit incorporating heating means according to the present invention,

Figure 5 is a detail view of the belt employed in the equipment shown in Figure 4,

Figure 6 is a detail view of an external connector for use with the equipment shown in Figures 4 and 5,

Figure 7 is a wiring diagram showing one mode of varying the degree of heating afforded and/or of enabling heating currents of two different voltages to be employed,

Figure 8 shows one mode of applying the invention to an under garment or lining for use with a flying suit,

Figure 9 shows the application of the invention to a suit consisting of separate trouser and jacket parts,

Figures 10 and 11 are views of parts of the equipment shown in Figure 9 but with parts undone to expose other parts,

Figure 12 shows another form of lining incorporating the present invention,

Figure 13 shows a suit for use in conjunction with the lining shown in Figure 12,

Figure 14 is a detail view showing how the heater elements may be attached to the arms of the garment shown in Figure 12,

Figure 15 is a detail view showing how the heater elements may be attached to the legs of the garment shown in Figure 12,

Figure 16 is a wiring diagram showing a circuit arrangement for incorporation in a belt and making provision for varying the heating afforded by the resistance elements, and

Figures 17 and 18 show one form of plug and socket connector suitable for use with a belt wired in accordance with the circuit shown in Figure 16.

Referring to Figures 1 and 2 of the drawings, the element consists of a strip of gauze 1 made for example from 43 S. W. G. stainless steel wire with 60 x 50 wires per square inch. The longi-

tudinal edges of the gauze are bound with fabric 2, which might for instance consist of adhesive tape.

The end or ends of the gauze 1 with which it is desired to make electrical connection is or are provided with press-stud connectors as shown at the right hand side of Figures 1 and 2 where three studs 3, 3, 3 are shown. In order to ensure good contact between said studs and the gauze 1 a strip of copper gauze 4 is superimposed on or interleaved in the stainless steel gauze and the two are folded so as to form two or more interlocked plies. The base parts of the studs 3, 3, 3 are then passed through holes in the folded gauze and the upper parts are secured thereto, said lower parts having relatively large base flanges 5 so as to afford good electrical contact and the complementary parts having flanges 6 for firmly gripping the assembly.

The gauze strip 1 may be encased within a fabric covering 7, which covering facilitates the handling of the element and prevents any short-circuiting due to folding. In cases where such covering is employed the upper ends of the studs 3 are of course exposed.

The aforesaid covering 7 may be secured by rows of stitching 8 and any such stitching operation can be carried out in an ordinary sewing machine.

The completed element may be secured to any desired article by a stitching operation which can also be carried out on any ordinary sewing machine and in order to cover any particular area the element may be zig-zagged over such area in any convenient way.

The aforesaid press-studs 3, 3, 3 of course co-operate with complementary socket portions and in cases where these are carried by a further heater element they may be secured to the gauze in a manner identical with that described with reference to the studs.

Figure 3 of the accompanying drawings shows how an element 9 may be bent into zig-zag formation. In this figure the element is bent over upon itself through ninety degrees and then at a closely spaced point it is bent under the lateral portion again through ninety degrees so that two parallel runs are formed. Obviously by bending the element through other angles the various runs may be disposed in any desired angular arrangement and/or the element can be racked to form a curve or follow any desired line.

Referring to Figure 4 of the drawings an aviator's suit 10 is provided with gauze heaters extending over the front and back of the garment and over the sleeves. In this embodiment one heater element is zig-zagged over the right hand front part of the garment including the front of the legs, this element being diagrammatically indicated in dotted lines 11, and the respective ends are provided with press-studs 12, 13 in the manner already described. A similar element extends over the left hand fore part of the garment and the ends are provided with press-studs 14, 15.

Gauze strips are similarly zig-zagged over each half portion of the back of the garment including the rear parts of the legs, these strips being provided with terminal studs 16 and 17, and 18 and 19 respectively.

The sleeves of the garment shown in Figure 4 are provided with elements whose continuity can be interrupted or completed at the cuff portions. Studs 20, 21 and 22, 23 are provided at the inner ends of the arm heating elements and the outer ends, i. e. the parts adjacent to the cuffs of the sleeves, are provided with press-studs 24, 25 and 26, 27, respectively. These pairs of studs can be coupled or uncoupled at will by straps 28, 29 carrying sockets and adapted to co-operate with said studs and preferably interconnected by gauze strips similar to those employed for the aforesaid heater elements.

By connecting or disconnecting the bridge straps 28, 29 the heating circuit of the sleeves can be closed or opened at will and by providing the external contacts 24, 25, 26, 27 provision is made for easily coupling up electrically heated gloves, the circuit through the gloves then completing the circuit through the sleeves.

If desired provision similar to that made at the cuff portions of the sleeves may be made at the ankle portions of the legs for enabling electrically heated boots, slippers, socks or the like to be connected in circuit.

The gauze strips employed in the sleeves of the above described suit may be of tinned iron of 42 S. W. G., and of 80 x 80 mesh per square inch in which case such gauze may be in strip form about ½" wide and there may be about 21½ feet in each sleeve whilst each front part of the suit may have about 23 feet of similar gauze ⅞ inch wide, and each rear part may have 33 feet of similar gauze ⅞" wide, the total wattage dissipation on a twelve volt supply being about 211 watts, i. e. 66 on the front of the suit, 79 on the back and 66 on the sleeves.

The suit shown in Figure 4 includes a belt 30 the ends of which can be releasably interconnected by means of a buckle 31. Strips of wire gauze extend through the belt 30 and these strips are connected to sockets forming complementary parts of the above-mentioned press studs on the suit and to press studs for connection to a current supply source. Figure 5 shows in detail the circuit arrangement of the belt and in this figure single lines are employed for denoting the various gauze strips. There are two main gauze strips 32, 33 extending around the belt, the upper strip being electrically connected to press sockets 34 and 35 for connection with the studs 12 and 15, press sockets 36 and 37 for connection to the studs 18 and 14, a press socket 38 for connection with the stud 21, a press socket 39 for connection with the stud 23, and a pair of studs 40, 40 for connection to external supply leads. The lower strip 33 is electrically connected to press sockets 41 and 42 for connection with the studs 13 and 17, press sockets 43 and 44 for connection with the studs 19 and 15, a press socket 45 for connection with the stud 20, a press socket 46 for connection with the stud 22, and a pair of studs 47, 47, for connection to external supply leads.

Figure 6 shows a suitable form of supply connector which includes two flexible leads 48, 49 having a plug 50 at one end for connection to a supply source, for example an accumulator or the like, and a fabric panel 51 at the other end. Said panel 51 has two pairs of sockets 52, 52 and 53, 53 positioned for engagement with the studs 40, 40, and 47, 47 respectively, the sockets 52, 52 being interconnected by a gauze strip and the studs 53, 53 being similarly interconnected.

When the belt 10 is fitted to the suit and the leads 48, 49 are connected to the belt and to a current source current will flow through the two gauze resistance elements on the front of the suit and through the two elements on the back, said four elements being in shunt. If the cuff straps, 28, 29 are connected or if gloves are connected

across the cuff studs current will also flow through the arm heaters which are also in shunt with the other heating circuits.

Figure 7 shows diagrammatically a wiring diagram for the above described belt wherein provision is made for varying the heat generated from a fixed current source say a twelve volt source or for enabling the suit to be heated from supplies at two different voltages, say twelve volt and twenty four volts. In this arrangement the group of sockets 54 will be assumed to be for connection to the studs connected to the upper ends of the body and arm heating elements located at one side of the suit, the sockets 55 for connection to the lower ends of said elements, the sockets 56 for connection to the upper ends of the body and arm heating elements located at the other side of the suit and the sockets 57 for connection to the lower ends of the last mentioned elements. The group of sockets 54 is connected to a lead 58, the groups of sockets 55 and 57 are connected to a lead 59 and the group of sockets 56 is connected to a lead 60. If lead 59 is connected to one pole of a supply source and leads 58 and 60 are connected to the other pole then the two heating circuits are in parallel and there will be maximum heating. If, however, lead 59 is disconnected and the leads 58 and 60 are connected to the respective poles of the supply source then the two heating circuits will be in series and there will be less heating. This possibility of varying the manner in which the various heating circuits are interconnected also enables different supply voltages to be employed. Thus, for instance, the elements may be so designed that a similar heating effect is attained when the heating elements are connected in parallel to a twelve volt supply as when said elements are connected in series to a twenty-four volt supply.

In the event of its being necessary to extend one strip of gauze by joining another thereto the joining can be easily effected by a splicing operation. Thus, for instance, the ends to be joined may be overlapped to a distance equal say to twice the width of the strip and each end may be encased in a Z-shaped piece of copper gauze, the superimposed assembly being secured for instance by rectangular and diagonal stitching in a sewing machine.

Referring to Figure 8, 61 denotes the lining garment of a known form of flying suit and to this garment there are fitted two heating elements 62, 63. The element 62 extends from press studs 64, 64 down the back of the garment around the ankle then up the front of the garment over the shoulder and back to studs 65, 65. The element 63 similarly extends on the other side of the garment from similarly disposed studs. The supply conductor unit 66 which may include a belt, has press sockets for engagement with the groups of press studs, some of such sockets being shown at the left hand side of Figure 8. If desired sleeve heating elements may also be provided and connections similar to those described with reference to Figure 4 may then be employed. If desired the belt may be wired as indicated in Figure 7 in order to provide for two degrees of heating.

Referring to Figures 9 to 11, the flying suit is in two parts, namely, a jacket portion 67 and a trousers portion 68. In this embodiment the jacket 67 is provided with detachable heater pads 69 and the trousers 68 are provided with detachable heater pads 70, said pads preferably conforming with the general contour of the parts of the garment for which they are intended. These pads are preferably secured to the garment by press fasteners some of the fasteners for the jacket being designated 71 and some of those for the trousers being designated 71a.

The aforesaid heater pads are provided with gauze elements similar to those hereinbefore described and press studs are employed for making electrical connection therewith. In Figure 10 groups of studs 72 and 73 are exposed these being the studs connected to the ends of the heater elements for the left hand side of the jacket as viewed in the figure. Complementary groups of press sockets 74 and 75 are provided in the jacket and studs extend from these sockets on to the outside of the jacket where a panel 76 (Figure 9) is fitted, said panel having sockets connected to a supply cable 77. Figure 11 shows some of the studs 78 in electrical connection with the trouser elements and these make connection with sockets 79 which are in electrical connection with gauze elements passing round the waist to the other side of the trousers and along a strap-like part 80, this part 80 being provided with sockets 81 for connection with studs 82 extending from the gauze in the panel 76. In this way current is supplied to the elements in the pads fitted to the trousers.

If it is desired to provide heating of the sleeve portions of the suit shown in Figure 9, current supply elements of copper gauze or other suitable material may extend from the press stud fasteners associated with the jacket heating elements to studs at the shoulder portions and connection with heater elements in the sleeves or in linings therefore may then be made by shoulder straps. Thus in Figure 9 the position of a current conductor element can be seen at 81 at the left hand side of the figure and a shoulder strap 82 for making electrical connection with the sleeve element can also be seen. A similar shoulder strap would of course also be included at the other side of the suit and may be fed with current by a continuation of the conductor 81, the respective sleeve circuits being arranged in parallel with the heating circuits of the body portion of the jacket.

Figures 12 and 13 show another form of flying equipment comprising an outer suit 83 and a separate inner suit 84, the outer suit being worn either with or without the inner one as may be desired. The inner suit 84 is provided with gauze heater elements in accordance with the present invention. The paths of the two body and leg elements can be seen from the lines of stitching some of which are designated 85 and the paths of the sleeve heating elements can also be seen from the lines of stitching some of which are designated 86.

The various heater elements are in electrical connection with press studs and current is supplied to these through complementary sockets fitted to a belt 87, said sockets also being connected to a supply cable 88, provided with any suitable plug for connection to an accumulator or other source of current supply.

Figure 14 shows how the sleeve heater elements may be arranged on the sleeves of the garment shown in Figure 12. One element 90 is fitted to each sleeve and the ends thereof are connected to press studs 92, 92, the sleeves being cut with what is known in the trade as an under arm pivot so that they reach to the belt line and so permit of said studs making engagement with contact sockets on the belt 87 (Figure 12).

Figure 15 shows how the two body and leg heating elements may be fitted to the garment 84 (Figure 12), the elements being designated 91 and 91a and terminating in groups of plugs 93, 93a for connection with complementary sockets on the belt 81. The line S denotes the back seam of the garment and it will be appreciated that such garment will comprise two sets of the sections shown in Figure 15.

The belt wiring shown diagrammatically in Figure 16 may be employed on the garment shown in Figure 12 and provides for various degrees of heating and for the use of supplies at various voltages. In this figure the sockets 94 are those for connection to the studs 93a extending from one end of the heating element 91a (Figure 15), the sockets 95 are those for connection to the studs at the other end of such element, the sockets 96 are those for connection to the studs 93 (Figure 15) at one end of the heating element 91 (Figure 15), the sockets 97 are those for connection to the studs at the other end of said last mentioned element and the two pairs of sockets 98, 99 and 100, 101 are those for connection to the studs at the ends of the respective sleeve heating elements. The two body and leg heating elements are diagrammatically represented by resistances 102, 103 and the two sleeve heating elements are diagrammatically represented by resistances 104, 105.

The contacts 94 are connected to the lead 106 of a three wire cable, the contacts 98, 96 and 101 are interconnected with one another by a wire 107 and the latter is connected to the lead 108 of the supply cable, and the sockets 99 and 100 are interconnected by a wire 109 which is in turn connected to the lead 110 of the cable and to said lead are also connected the sockets 95 and 97.

On a twelve volt supply the above circuit provides for three degrees of heating. Thus lead 110 may be connected to the negative pole and leads 106 and 109 may be connected to the positive pole so putting the resistances 102, 103, 104 and 105 in shunt and providing for maximum heating. In order to provide medium heating lead 109 may be entirely disconnected so cutting out the resistance 102, and in order to provide low heating leads 106 and 110 may be connected to the respective poles, lead 108 remaining disconnected and so cutting out resistances 103, 104 and 105. In the case where the suit is heated from a twenty four volt supply high heating may be attained by connecting leads 106 and 108 to the supply poles the arms being rewired so that their heater elements are in series and lower heat may be attained by cutting out the arm heating elements. The system provides therefore for operation on two different voltages, e. g. twelve volt and twenty four volt and for three degrees of heating on the lower voltage and for two degrees of heating on the upper one.

The adaptor plug fitted to the above mentioned three wire cable and the socket for co-operation therewith may be so designed that the particular degree of heating attained can be determined by the relative positions of the plug and socket.

Figure 17 shows one suitable form of plug and Figure 18 shows one form of complementary socket which may, for instance be fitted to an accumulator. The plug 111 is provided with four legs 112, 113, 114 and 115, the leg 112 being connected to the lead 110, the leg 113 to the lead 106, the leg 115 to the lead 108 and the leg 114 being a dummy one. The socket unit 111a has a socket 116 connected to one pole of the accumulator, sockets 117 and 118 bridged by a conductor 119 and connected to the other pole of the accumulator, and a dummy socket 120. The plug can therefore be inserted in a position in which the lead 110 is connected say to the negative pole and leads 106 and 109 to the other pole or either of the leads 110, 106 or 108 can be connected to socket 120, i. e. put out of circuit.

Whilst I have hereinbefore described some embodiments of the present invention it is to be understood that there may be various modifications without departing from the scope of such invention. Thus, for instance, the heater elements may be of any desired length or width and they may be made from wire of any desired gauge. It is further to be understood that heater elements in accordance with the present invention may be applied to or be embodied in various forms of clothing such as suits, gloves, boots, socks or the like or in other equipment such as heater pads, blankets, muffs, coverings or the like in addition to those specifically mentioned herein.

I claim:

1. An electrical resistance heating element comprising a strip of wire gauze covered with flexible fabric and having press-stud connectors secured to said gauze for enabling electrical connection to be made therewith.

2. An electrical resistance heating element comprising a strip of gauze incorporating stainless steel wire covered with flexible fabric and having press-stud connectors secured to said gauze for enabling electrical connection to be made therewith.

3. An electrical resistance heating element comprising a strip of wire gauze covered with flexible fabric and having press-stud connectors secured to said gauze for enabling electrical connection to be made therewith, said gauze having a mesh of 60 x 50 wires per inch of surface area.

4. An electrical resistance element as claimed in claim 2 including strips of gauze made of low resistance material such as copper located between said press-stud connectors and said stainless steel gauze so as to improve the electrical connection between the latter and said connectors.

5. Electrically heated clothing incorporating at least one electrical resistance element consisting of a strip of gauze incorporating stainless steel wires.

6. Electrically heated clothing incorporating at least one electrical resistance element consisting of a strip of gauze with press stud connectors passing therethrough for enabling electrical connection to be made therewith.

7. Electrically heated clothing incorporating a plurality of electrical resistance elements consisting of strips of gauze some of which have press-stud connectors fitted thereto for enabling electrical connection to be made therewith.

8. An electrically heated suit incorporating electrical resistance elements consisting of strips of wire gauze the ends of such strips being located adjacent to the waist line of the suit and being provided with press-stud connectors for enabling connection to be made with current supply leads.

9. An electrically heated suit as claimed in claim 8 including a belt pad, current supply leads incorporated in said belt pad and press stud connectors on said belt pad and connected to said

leads, said connectors being adapted to cooperate with the press-studs carried by the suit.

10. An electrically heated suit having limb and trunk portions, electrical resistance elements consisting of strips of wire gauze incorporated in said limb and trunk portions, press stud connectors fitted to said resistance elements, and releasable connectors incorporating complementary press stud connectors for putting said limb elements into and out of circuit independently of the trunk elements.

11. An electrically heated suit having separate trousers and jacket portions, electric resistance elements consisting of strips of wire gauze incorporated in said trousers and in said jacket and a strap into which the heating system of one portion of said suit is extended, said strap being provided with connectors for making detachable connection with the heating system of the other portion of said suit.

12. An electrically heated suit having a detachable lining, heater elements consisting of strips of wire gauze incorporated in said lining, and press-stud connectors for enabling said lining to be detachably attached to said suit, some of said press stud connectors being in electrical connection with said heater elements and serving for making electrical connection between said elements and current supply means.

13. An electrically heated suit according to claim 12 wherein said gauze strips are made from stainless steel wire and strips of gauze made of copper are located between said strips of stainless steel and said press-stud connectors forming part of the electrical circuit so as to ensure good electrical connection between said connectors and said stainless steel gauze strips.

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This invention relates in general to an electrically heated footwear, and more specifically to an electrically heated sock having a circuit including an electric power source and electric heater operatively connected thereto wholly contained within the sock.

Considerable efforts have been made to attain a highly efficient electrically heated footwear as for example, a sock to keep one's feet warm. Heretofore all the known efforts to electrically heat such a sock required a source of electrical power which was extraneous or remotely disposed from the sock itself, e.g. a fixed source, such as household or vehicle power, or a portable power pack carried on the person's body. When the line current from a fixed source of electrical power was utilized, e.g. in a home or vehicle, the mobility of the person wearing such heated sock or footwear was necessarily limited to the length of cord or wire required for conducting the current from the fixed power source to the sock. Consequently, such socks had only limited application, as for example when sleeping, resting or when flying an airplane or operating some other vehicle wherein movement of the wearer was necessarily confined and where sufficient power was available to energize the heater of such socks.

To obviate the mobility handicap of such electrically heated footwear socks, efforts have been made to provide a portable power pack by which the heater of such socks or footwear may be energized. Because of the energy heretofore required to energize the heater used in such socks, such efforts resulted in utilizing a relatively large sized battery or power pack which had

to be worn by the wearer about his waist. For this reason long conductors or wires were required to extend along the body of the wearer to connect the power pack to the heating means disposed within the sock or footwear. Such power packs, however, due to the size requirements of the battery necessary to energize such heaters, were relatively bulky, heavy and cumbersome to wear. Also, the wires required to extend from the power pack and the sock greatly interfered with the mobility of the person wearing such sock and associated power pack unit.

It is, therefore, an object of this invention to provide a heated footwear, sock or the like with an improved type electrical heating means capable of operating on very low voltages, whereby the power source to energize the same comprises a small, low voltage battery which can be concealed wholly within the footwear or sock itself.

Another object of this invention is to provide an improved heated sock which is completely immersible in water and consequently can be either machine or hand-washed with ease and without adversely affecting the electrical portion of the sock.

Another object of this invention is to provide a heated sock which is longlasting and non-allergic to the wearer.

Another object of this invention is to provide an improved heated sock in which the distribution of heat can be located where most desirable.

Another object of this invention is to provide a heated sock which is relatively simple in construction, inexpensive to fabricate, and which is positive in operation.

Another object of this invention is to provide a heated footwear or sock having an improved heater construction.

Another object of this invention is to provide an electrically heated sock having an entirely self-contained source of electrical energy and heater energized thereby.

Another object of this invention is to provide in an electrically heated ~~wear~~ sock a circuit including a low-voltage, battery and connected heater with provisions for conserving the useful life of the battery to its maximum extent.

The foregoing objects and other features and advantages are attained by an electrically energized footwear as for example, a sock which may be of conventional construction, i.e. it may be either woven or knitted, and comprising essentially of a toe portion, a heel portion and a connected leg portion with the usual elastic top or band adjacent the upper end thereof. In accordance with this invention an electrical heating means is located within the sock. The heating means is preferably located adjacent to toe portion of the sock and it is energized entirely by a low-voltage battery which is also carried within the sock itself. Accordingly, a means is located adjacent to the upper end or band of the sock to define a pocket for containing a holder to which a small

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low-voltage battery is detachably secured. In the toe portion of the footwear there is formed a pocket for receiving the heating means. In accordance with this invention the heating means comprises an electrical resistor formed of a flat strip of high electrically resistant material, such as that sold under the trade mark "Nichrome". The resistor is operatively connected in circuit to the battery by means of conductors which run along the inside of the sock. To enhance the heating characteristic of the heating means, a radiating surface is operatively connected to the electrical resistor in heat transfer relationship. The radiation surface comprises flat metallic sheet material or foil which is electrically insulated but in a heat-conducting relationship with the electrical resistor. Accordingly, the arrangement is such that the heating means can be shaped to conform to any desired shape. By utilizing a flat element added comfort is attained to the wearer of such footwear.

The "Nichrome" product mentioned herein may be defined as a nickel-based alloy series with 11 to 22% chromium and smaller amounts of silicone and manganese. Some iron may be optionally included in the alloy which is resistant to oxidation at red heat and has high electrical resistance qualities.

To conserve the useful life of the battery, a circuit breaking means is interposed in the circuit between the heating means and the battery, which in effect operates as a thermostat, intermittently breaking and making the circuit, as determined by the power requirements thereof.

A feature of this invention resides in an electrically heated footwear or sock having a self-contained electrical power source and heating means operatively connected thereto.

Another feature of this invention resides in electrically heated sock which is readily washable.

Another feature of this invention resides in the provision of utilizing the heater construction which includes an electrical resistor with connected heat radiating surfaces so as to expand the heating area of the heater.

Another feature of this invention resides in the provision of an improved heating element which can be energized by a very low-voltage battery.

Another feature of this invention resides in the provision of an improved electrically heated sock or the like which can be worn with all the comfort and convenience of ordinary socks or footwear.

Other features and advantages will become more readily apparent when considered in view of the description and drawings in which:

Fig. 1 illustrates a sectional side view of a sock construction embodying the instant invention.

Fig. 2 illustrates a ~~prospective~~ perspective view of the improved electrical heater and source of power necessary to energize the same, as utilized in the sock construction of Figure 1.

Fig. 3 is a schematic illustration of the electrical circuit utilized in the sock construction of Figure 1.

Fig. 4 is a sectional view of the heating means taken along line 4-4 on Figure 2.

Referring to the drawings there is shown therein an improved footwear construction 10 embodying the instant invention, which is herein illustrated as a sock. The

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sock 10 may be conventionally formed, i.e. woven or knitted, and comprises generally of a toe portion 10A, a heel portion 10B, and a connected leg portion 10C having an elastic band 11 or the like adjacent the upper end thereof.

In accordance with this invention the sock 10 is electrically heated by means of a low-voltage heating means 12 suitably positioned within the sock 10. In the illustrated form of the invention, the heating means 12 is located adjacent the toe portion 10A of the sock. To accommodate the heating means 12 within the sock there is formed an internal pocket 13 in the toe portion 10A.

The heating means 12 as best seen in Figure 2 is readily inserted into the pocket 13 which is defined by the sole or bottom portion of the sock and a layer of material 13A which is sewn adjacent thereto on the inside surface of the sock. The heating means 12 comprises a flat strip of electrical resistance material 14, as for example "Nichrome". The "Nichrome" strip or resistor 14 in turn is connected in circuit with a suitable source of electrical power as for example, a low-voltage battery 15 which is adapted to be carried in the sock 10 itself.

In the illustrated form of the invention the battery 15 is carried in the pocket 16 formed in the upper end of the sock; and preferably in the band portion 11 thereof. The size of the pocket 16 is such that it can readily accommodate the battery holder 17 and a small low-voltage battery 15 for energising the heater 12 as will be hereinafter described. The holder 17 is constructed

so that the battery can releasably attach thereto.

As best seen in Figure 2, the battery holder 17 comprises a base member 18 which has connected thereto a pair of spring finger or terminals 19, 20 which are arranged to engage with the terminal portions of the battery 15. Connected to or integrally formed with the front finger or terminal 19, is a resilient clip 21 which serves to embrace the side portions of the battery 15 as shown. Accordingly, the battery 15 can be readily releasably attached to the holder 17 by positioning the same between the terminal fingers 19, 20 and associated clip 21. Accordingly, the battery is frictionally retained against longitudinal movement by means of the spring finger terminals 19, 20, and against lateral movement by the spring clip portion 21.

Suitable conductors 22, 23 connect the battery into circuit with the heater 12. Accordingly, the ends of one conductor 23 are connected between the "Nichrome" strip 14 and the battery terminal 20. The other conduit or wire 23 is connected to the other battery terminal 19 and the other end of the "Nichrome" strip 14. With the resistors so connected, it is placed in circuit with the battery when the battery is placed in the holder 17. A suitable binding 24 conceals or covers the conductors 22, 23 against the leg portion of the sock.

The heating surface of the "Nichrome" strip 14 is enhanced by radiation means connected in heat transfer relationship therewith. In the illustrated form of the invention, the heat radiating means comprises a sheet of

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heat-conducting material, as for example, metallic foil 25, such as aluminum foil or the like which is connected in heat transfer relationship to the "Nichrome" strip 14. In the illustrated embodiment, two similar strips 25, 25A may be disposed in back-to-back relationship on either side of the resistant element so as to be secured thereto in heat transfer relationship with it and each other. A suitable means for securing the foil to the resistor 14 may be by applying an adhesive coating to the back of the foil. Accordingly, the adhesive backing also functions to electrically insulate the electrical resistor from the foil while at the same time securing the foil 25, 25A in heat transfer relationship to the resistor 14. The foil 25, 25A may be also electrically insulated by anodizing the foil.

As shown, the heating area or surface of the resistor 14 can be expanded to any desired width or shape depending upon the shape and form of the radiating strips 25, 25A. Thus, with a very narrow resistor, the heat therefrom can be effectively distributed over a relatively large area. Consequently the heat generated is not confined to a single point, but is comfortably distributed for uniform heating.

In the illustrated form of the invention it will be readily noted that the heating means 12 was initially formed as an elongated member which was subsequently folded to define the U-shaped heater 12 which is readily inserted into the toe pocket 11 of the sock 10.

In operation, it will be noted that whenever the battery 15 is interposed between the terminals 19, 20 of the battery holder, the circuit to the heater will become energized.

If desired, a suitable switching means (not shown) may be connected in series between the battery 15 and the heating element 12 so as to control the operation of the circuit.

In accordance with this invention a means is provided for extending the life of the battery. Experience has shown that the temperature required to be generated by the heater need be only slightly greater than that of normal body temperature to keep one's feet warm. For this reason the power requirement to energize the heater need not be constant. For this reason the heater circuit can be intermittently operated, as may be required by the body temperature or demand of the wearer. This is attained by interposing an automatically operating circuit breaker 26 of known construction in the line between the battery 15 and the heater. Accordingly, the circuit breaker is constructed so that it will function as a thermostat for intermittently making and breaking the circuit to the heater according to the power requirements. Accordingly by utilizing intermittent operation, it has been discovered that the useful life of the battery 15 can be substantially extended.

The heating means 12 described is arranged and constructed to operate with very low-voltage battery. For example, three to four 1½-volt batteries may be utilized

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to energize the heater, or a 3-volt battery can satisfactorily energize the heater 12. Also 2 D-cell batteries can be used to energize the heater 12.

From the foregoing it will be readily noted that the heated footwear 10 described comprises a wholly contained unit in which the source of power 15 and the heater 12 can be wholly disposed within the makeup of the sock 11 itself. The entire sock 10 is relatively light in weight and which when worn can be worn with the convenience and luxury of an ordinary sock. Consequently, the wearer is not required to wear any bulky power pack unit which is rendered readily apparent to another person. With the invention described, the footwear is given all the appearance and has all the comfort of a conventional footwear, but with the added provision that a source of heat is provided to add additional comfort in extreme cold. Accordingly, the heated sock has particular application as sport wear, e.g. hunting and/or fishing in the cold, or cold climates, and can be worn so as to not interfere in any manner with the movements of the wearer. Also, the overall weight thereof is reduced to a minimum.

While the instant invention has been particularly defined as applied to an electrically heated sock it will be readily noted that the novel heating means may be readily applicable to other body heating garments and/or applications. Therefore, while the instant invention is disclosed and described with reference to a heated sock, it will be readily understood and appreciated that

variations and modifications may be made without departing from the spirit or scope of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:-

1. In combination, a sock having a toe portion, a heel portion, and a connected leg portion, means for electrically heating said sock, said means including a source of electrical energy carried adjacent the connected leg portion of said sock, and an electrical heater operatively connected in circuit with said source of electrical energy, said heater being located in the toe portion of the sock, and said heater comprising a low-voltage electrical resistor, and a heat radiating means connected to said resistor in heat transfer relationship thereto to expand the heating surface of said resistor.

2. The invention as defined in claim 1 wherein said source of electrical energy comprises a low-voltage battery.

3. The invention as defined in claim 2 wherein said battery is less than 6 volts.

4. A heated sock comprising:

(a) a toe portion, a heel portion, and a connected ankle portion,

(b) means for electrically heating said footwear,

(c) said latter means comprising a flat electrical resistor being disposed within the toe portion of said sock, said resistor being adapted to be connected in circuit with a source of power carried directly on said footwear, and

(d) means connected in heat transfer relationship to said flat resistor to diffuse the heat of said resistor over an expanded heating surface.

5. A sock comprising:

(a) a toe portion, a heel portion, and a connected leg portion,

(c) said latter means comprising a low-voltage battery carried directly on said sock,

(d) an electrical resistor connected in circuit with said battery, said resistor being disposed within the toe portion of said sock, and

(e) means connected in heat transfer relationship to said flat resistor to diffuse the heat of said resistor.

6. A footwear comprising, a toe portion, a heel portion, a connected leg portion, means for electrically heating said ...wear, said latter means comprising a low-voltage battery carried ...ctly on said footwear, and an electrical resistor connected in ...cuit with said battery, said resistor being disposed within the ... portion of said footwear, and radiation means connected in heat ...nsfer relationship to said resistor to expand the heating surface ... said resistor, said resistor comprising a flat strip of electri...lly resistant material.

7. The invention as defined in claim 6 wherein said radia...ion means includes a strip of heat-conducting material electrically ...nsulated from said flat strip of resistant material.

8. The invention as defined in claim 6 wherein said radia...ion means includes a pair of heat conducting strips disposed in ...back-to-back relationship for sandwiching therebetween said resis...tant material.

9. The invention as defined in claim 7 wherein said heat-conducting material includes an adhesively backed metallic foil strip which is adhesively secured to said resistor, said adhesively backed strip electrically insulating said foil strip from said resistor without adversely affecting the heat transfer relationship therebetween.

10. The invention as defined in claim 7 and including a circuit breaker in the circuit to said resistor to intermittently

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make and break the circuit to said resistor.

11. In combination:

(a) a woven sock having a toe portion, a heel portion, and a connected leg portion,

(b) means defining a pocket adjacent the upper end of said leg portion,

(c) a holder adapted to releasably secure a low-voltage battery in said pocket,

(d) means defining a pocket in the toe portion of said sock,

(e) a heater disposed in said toe pocket,

(f) said heater including a flat strip of bare electrical resistance material,

(g) radiation means connected in heat transfer relationship to said flat strip for defining an expanded radiation surface for said heater,

(h) said radiation means including a pair of heat-conducting sheets for sandwiching said resistor in heat transfer relationship therebetween,

(i) means joining said heat-conducting strips together and electrically insulating said strips from said resistor,

(j) electrical conductors connecting said resistor in circuit to said battery,

(k) means for maintaining said conductors against the leg portion of said sock,

(l) and a circuit breaker connected in circuit with said heater to intermittently make and break the circuit.

12. In combination:

(a) a woven sock having a toe portion, a heel portion

(b) means defining a pocket adjacent the upper end of said leg portion,

(c) a holder adapted to releasably secure a low voltage battery in said pocket,

(d) electrical non-conductive means defining a pocket in the toe portion of said sock,

(e) a heater disposed in said toe pocket,

(f) said heater including a flat resistor strip of electrical resistance material,

(g) radiation means connected in heat transfer relationship to said flat resistor strip for defining an expanded radiation surface for said heater,

(h) said radiation means including a pair of heat conducting sheets of material for sandwiching said resistor strip in heat transfer relationship therebetween,

(i) means joining said heat conducting strips together and electrically insulating said strips from said resistor strip,

(j) electrical conductors connecting said resistor strip in circuit to said battery,

(k) means for maintaining said conductors against the leg portion of said sock,

(l) and a circuit breaker connected in circuit with said heater to intermittently make and break the circuit.

13. In combination

(a) a woven sock having a toe portion, a heel portion and a connected leg portion,

(b) means defining a pocket adjacent the upper end of said leg portion adapted to receive a low voltage

(c) electrical non-conductive means defining a pocket in the toe portion of said sock,

(d) a heater disposed in said toe pocket,

(e) said heater including a flat resistor strip of electrical resistance material,

(f) radiation means connected in heat transfer relationship to said flat resistor strip for defining an expanded radiation surface for said heater,

(g) said radiation means including a pair of heat conducting sheets of material for sandwiching said resistor strip in heat transfer relationship therebetween,

(h) means joining said heat conducting strips together and electrically insulating said strips from said resistor strip,

(i) electrical conductors connecting said resistor strip in circuit to said battery, and

(j) means maintaining said conductors against the leg portion of said sock.

14. The invention as defined in claim 13 wherein said heat conducting sheets of material comprise metallic foil connected in heat transfer relationship to said resistor strip.

15. The invention as defined in claim 13 wherein said means joining said heat conducting strips comprises an adhesive coating on one side of said heat conducting strips whereby said heat conducting strips of material are adhesively secured in back to back relationship to sandwich said resistor strip therebetween in heat transfer relationship therewith.

16. In combination, a woven sock having a toe portion, a heel portion, and a connected leg portion, means defining a pocket adjacent the upper end of said leg portion adapted to receive a low-voltage battery of less than six volts, a heater disposed in the toe portion of the sock only, said heater including a resistor strip

of electrical resistance material, electrical conductors connecting said resistor strip in circuit to said battery supported in said pocket adjacent the upper end of said leg portion and means for maintaining said conductors against the leg portion of said sock.

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Fig. 1

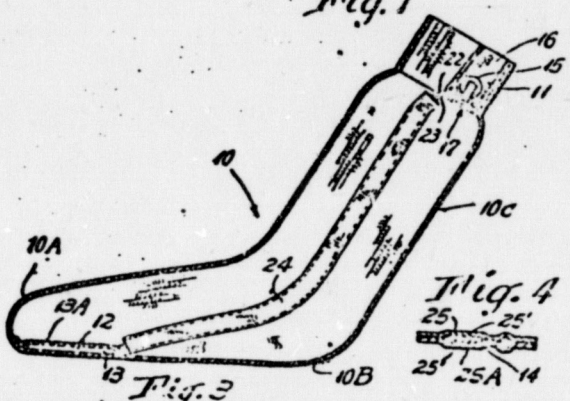


Fig. 4

Fig. 3

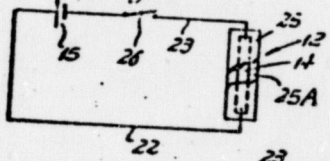
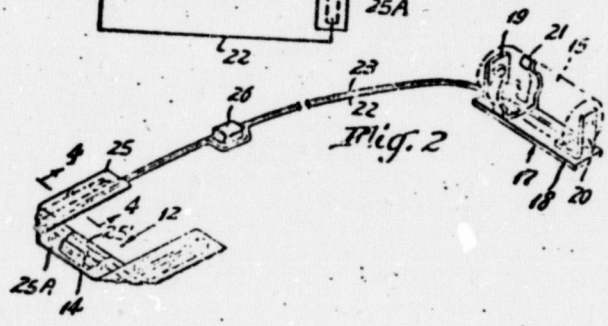


Fig. 2



PLAINTIFF'S EXHIBIT
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IDEN.
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PATENT SPECIFICATION 1,128,224

DRAWINGS ATTACHED.

1,128,224

Date of Application and filing Complete Specification:
8 Sept., 1966. No. 40227/66.

Application made in United States of America (No. 487,011) on 13 Sept., 1965.

Complete Specification Published: 25 Sept., 1968.

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Index at Acceptance:—H5 H(1B, 2E4E, 2E6, 3C, 3T).

Int. Cl.:— H 05 b 3/02.

COMPLETE SPECIFICATION.

Electrically Heated Socks.

I, RAPHAEL JOSEPH COSTANZO, a citizen of the United States of America of 119 Park Street, Bridgeport, Connecticut, in the County of Fairfield, State of Connecticut, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to an electrically heated sock.

Considerable efforts have been made to attain highly efficient electrically heated socks which will keep the wearer's feet warm. Heretofore all the known efforts to heat such a sock electrically required a source of electrical power which was extraneous or remotely disposed from the sock itself, e.g. a fixed source, such as household or vehicle power, or a portable power pack carried on the person's body. When the line current from a fixed source of electrical power was utilized, e.g. in a home or vehicle, the mobility of the person wearing such a heated sock was necessarily limited to the length of cord or wire required for conducting the current from the fixed power source to the sock. Consequently, such socks had only limited application, as for example when sleeping, resting or when flying an airplane or operating some other vehicle in which movement of the wearer was necessarily confined and where sufficient power was available to energize the heater of such socks.

To obviate the mobility handicap of such electrically heated socks, efforts have been made to provide a portable power pack by which the heater of such socks may be energized. Because of the energy heretofore required to energize the heater used in such socks, such efforts resulted in utilizing a relatively large sized battery or power pack which had to be worn by the wearer about his waist. For this reason long conductors or wires were required to extend along the body of the wearer to conect the power pack to the heating means disposed within the sock. Such power packs, however, due to the size requirements of the battery necessary to energize such heaters, were relatively bulky, heavy and cumbersome to wear. Also the wires extending between the power pack and the sock greatly interfered with the mobility of the person wearing such sock and associated power pack unit.

According to this invention there is provided a sock having integrally connected toe, heel and leg portions and provided with electrical heating means, characterized in that the electrical heating means includes an electrical heater disposed in the toe portion only of the sock and connected in circuit with a source of electrical energy carried adjacent the leg portion of the sock.

Preferably a heat-diffusing surface is connected in heat-transfer relationship with the electrical heater to diffuse the heat generated thereby over an expanded area.

To conserve the useful life of the source of electrical energy, a circuit breaking means may be interposed in the circuit between the heating means and the battery, which in effect operates as a thermostat, intermittently breaking and making the circuit, as determined by the power requirements thereof.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 illustrates a sectional side view of a sock construction embodying the present invention.

Fig. 2 illustrates a perspective view of an improved electrical heater and a source of power for energising the same, as utilized in the sock construction of Figure 1.

Fig. 3 is a schematic illustration of an

[Price 4s. 6d.]

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electrical circuit utilized in the sock construction of Figure 1.

Fig. 4 is a sectional view of the electrical heater taken along line 4—4 in Figure 2.

The sock 10 illustrated in the drawings may be conventionally formed, i.e. woven or knitted, and comprises generally a toe portion 10A, a heel portion 10B, and a leg portion 10C having an elastic band 11 or the like adjacent the upper end thereof. The toe portion 10A, the heel portion 10B and the leg portion are integrally connected.

The sock is electrically heated by means of a low-voltage heating means 12 suitably positioned within the toe portion 10A only of the sock 10. To accommodate the heating means 12 an internal pocket 13 is formed in the toe portion 10A.

The heating means 12 is readily inserted into the pocket 13 which is defined by the sole or bottom portion of the sock and a layer of material 13A which is sewn to the inside surface of the sock. The heating means 12 comprises a flat strip of electrical resistance material 14, such as for example Nichrome (Registered Trade Mark). The Nichrome strip or resistor 14 in turn is connected in circuit with a suitable source of electrical power such as for example a low-voltage battery 15 which is carried by the leg portion of the sock 10.

In the illustrated form of the invention, the battery 15 is carried in a pocket 16 formed in the band portion 11 of the leg 10C of the sock. The size of the pocket 16 is such that it can readily accommodate a battery holder 17 and a small low-voltage battery 15 for energizing the heater 12 as will be hereinafter described. The holder 17 is constructed so that the battery can be removably secured therein.

As best seen in Figure 2, the battery holder 17 comprises a base member 18 which has connected thereto a pair of spring fingers or terminals 19, 20 which are arranged to engage with the terminal portions of the battery 15. Connected to or integrally formed with the front finger or terminal 19, is a resilient clip 21 which serves to embrace the side portions of the battery 15 as shown. Accordingly, the battery 15 can be readily removably secured in the holder 17 by positioning the same between the terminal fingers 19, 20 and the associated clip 21. The battery is frictionally restrained against longitudinal movement by means of the spring finger terminals 19, 20 and against lateral movement by the spring clip portion 21

Conductors 22, 23 connect the battery in circuit with the heater 12. The ends of one conductor 22 are connected between the Nichrome (Registered Trade Mark) strip 14 and the battery terminal 20. The other conductor 23 is connected to the other battery terminal 19 and the other end of the Nichrome (Registered Trade Mark) strip 14. With the resister so connected, it is placed in circuit with the battery when the battery is placed in the holder 17. A binding 24 conceals or covers the conductors 22, 23 against the leg portion of the sock.

The heating surface of the Nichrome (Registered Trade Mark) strip 14 is enhanced by heat-diffusing means connected in heat transfer relationship therewith. In the illustrated form of the invention the heat-diffusing means comprises a sheet 25 of heat-conducting material, such as metallic foil 25, e.g. aluminium foil or the like, which is connected in heat-transfer relationship with the Nichrome (Registred Trade Mark) strip 14. Two similar strips 25, 25A may be disposed in back-to-back relationship on either side of the resistor element so as to be secured thereto in heat-transfer relationship with it and each other. A suitable means for securing the foil to the resistor 14 is an adhesive coating 25' applied to the back of the foil. Accordingly, the adhesive backing 25' also functions to electrically insulate the electrical resistor from the foil, while at the same time securing the foil 25, 25A in heat-transfer relationship to the resistor 14. The foil 25, 25A may be also electrically insulated by anodizing the foil.

As shown, the heating area or surface of the resistor 14 can be expanded to any desired width or shape depending upon the shape and form of the diffusing strips 25, 25A. Thus, with a very narrow resistor, the heat therefrom can be effectively distributed over a relatively large area. Consequently the heat generated is not confined to a single point, but is comfortably distributed for uniform heating.

In the illustrated form of the invention the heating means 12 was initially formed as an elongated member which was subsequently folded to define the U-shaped heater 12 which is readily inserted into the toe pocket 13 of the sock 10.

In operation, whenever the battery 15 is interposed between the terminals 19, 20 of the battery holder, the circuit to the heater will become energized.

If desired, a suitable switching means (not shown) may be connected in series between the battery 15 and the heating element 12 so as to control the operation of the circuit.

Means are preferably provided for [illegible]ading the life of the battery. Experi[illegible] has shown that the temperature required to be generated by the heater need be only slightly greater than that of normal body temperature to keep one's feet warm. For this reason the power requirement to energize the heater need not be constant. Thus, the heater circuit can be intermittently operated, as may be required by the body temperature or

demand of the wearer. This is attained by interposing an automatically operating circuit-breaker 26 of known construction in the line between the battery 15 and the heater. The circuit breaker is constructed so that it will function as a thermostat for intermittently making and breaking the circuit to the heater according to the power requirements. By utilizing intermittent operation, it has been discovered that the useful life of the battery 15 can be substantially extended.

The heating means 12 described above is arranged and constructed to operate with a very low-voltage battery. For example, three to four 1½-volt batteries or a 3 volt battery may be utilized to energize the heater 12. Alternatively, two conventional dry cell flashlight batteries can be used to energize the heater 12.

The heated sock 10 described comprises a wholly contained unit in which the source of power 15 and the heater 12 can be wholly disposed within the makeup of the sock 10 itself. The entire sock 10 is relatively light in weight and can be worn with the convenience and luxury of an ordinary sock. The wearer is not required to wear any bulky power pack unit which is rendered readily apparent to another person. The sock is comparable in appearance and comfort to conventional socks, while having the added advantage that a source of heat is provided to add additional comfort in extreme cold. Accordingly, the heated sock has particular application as sportswear, e.g. for shooting and/or fishing in the cold or cold climates, and can be worn so as not to interfere in any manner with the movements of the wearer. Also, the overall weight thereof is reduced to a minimum.

WHAT I CLAIM IS:—

1. A sock having integrally connected toe, heel and leg portions and provided with electrical heating means, characterized in that the electrical heating means includes an electrical heater disposed in the toe portion only of the sock and connected in circuit with a source of electrical energy carried adjacent the leg portion of the sock.

2. A sock according to claim 1, characterized in that a heat-diffusing surface is connected in heat-transfer relationship with the electrical heater to diffuse the heat generated thereby over an expanded area.

3. A sock according to claim 1, characterized in that said electrical heater includes a low-voltage electrical resistor element.

4. A sock according to any of the preceding claims, characterized in that the source of electrical energy comprises a low-voltage battery of less than six volts.

5. A sock according to claim 2, characterized in that the heat-diffusing surface is electrically insulated from the electrical heater.

6. A sock according to any of the preceding claims, characterized in that the electrical heater includes a flat strip of electrically resistant material.

7. A sock according to claim 2 or 5, characterized in that the heat-diffusing surface includes heat-conducting strips disposed in back-to-back relationship with the electrical heater sandwiched between them.

8. A sock according to claim 2, 5 or 7 characterized in that the heat-diffusing surface includes an adhesively backed metallic foil strip adhesively secured to the electrical heater, said adhesive backing electrically insulating the foil strip from said heater without adversely affecting the heat-transfer relationship between them.

9. A sock according to any of the preceding claims, characterized in that a circuit-breaker is disposed in the circuit of the electrical heater to intermittently make and break the said circuit.

10. A sock according to any of the preceding claims, characterized in that a pouch is connected adjacent the upper end of said leg portion and the source of electrical energy is adapted to be removably secured in this pouch.

11. A sock according to claim 2, 5, 7 or 8, characterized in that a pocket is formed in the toe portion of the sock, and the electrical heater and the heat-diffusing surface connected therewith are fitted into said pocket.

12. An electrically heated sock substantially as hereinbefore described with reference to the accompanying drawings.

REDDIE & GROSE,
Agents for the Applicants,
6 Bream's Buildings,
London, E.C.4.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1968.
Published at The Patent Office, 25 Southampton Buildings, London, W.C.2,
from which copies may be obtained.

1128224 COMPLETE SPECIFICATION

1 SHEET This drawing is a reproduction of the Original on a reduced scale

Fig. 1

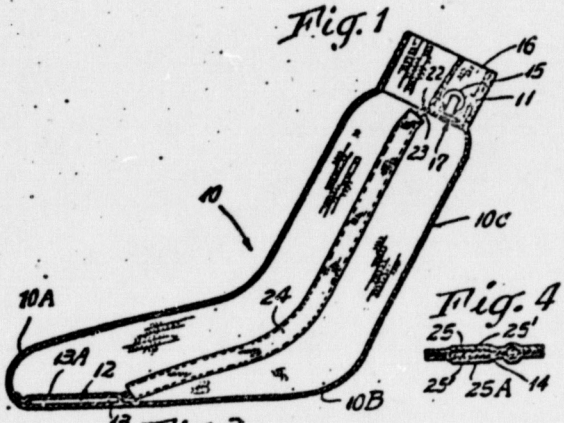


Fig. 4

Fig. 3

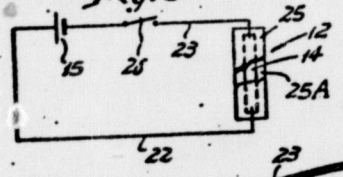
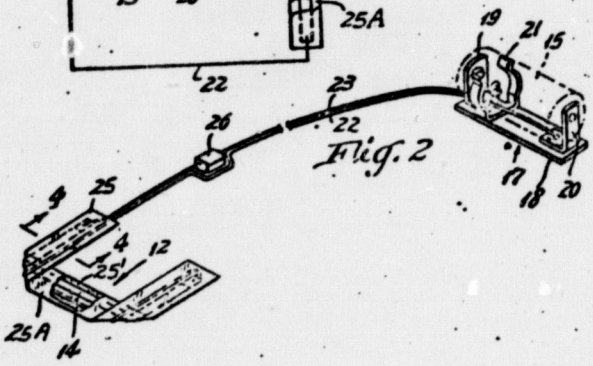


Fig. 2



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特願 昭41-58281
出願日 昭41.9.5
優先権主張 1965.9.13（アメリカ国）
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図面の簡単な説明

第1図は本発明を実施した靴下構造体の断面側面図、第2図は第1図の靴下構造体に使用される改良した電気ヒータおよび該ヒータを付勢するのに必要な電源を示す斜視図、第3図は第1図の靴下構造体に使用する電気回路の結線図、第4図は第2図の4－4線に沿う加熱装置の断面図である。

発明の詳細な説明

本発明は一般的には電気的に加熱された足部着用体に関し、特に全体的に靴下の中に含まれている電力源および作動的に該電力源に接続された電気ヒータを含む回路を有する電気的に加熱された靴下に関するものである。

たとえば人の足を温く保持するための靴下のごとく、効率よく電気的に加熱した足部着用体を得るために、いろいろの努力がなされた。従来かかる靴下を電気的に加熱するためのすべての努力は、靴下自体の外部すなわち靴下から遠く離れて設置した電力源、たとえば、家庭用または自動車の電源のごとき固定した供給源または人の体に支承された可搬電力源を必要とした。たとえば家庭内や自動車内におけるごとく固定した電力源からの電流が用いられる場合、かかる加熱した靴下または足部着用体をはいている人の運動範囲は必然的に固定電源から靴下に電流を導くのに必要なコードまたはワイヤーの長さによつて制限されてしまう。その結果、かかる靴下の適用性は、たとえば寝ている場合とか休んでいる場合とかあるいは飛行機で飛行中とか自動車の運転中のごとく着用者の運動範囲が必然的に制限されてしかも充分な電力がかかる靴下のヒータを付勢するのに入手できる場合に限定されてしまつた。

かかる電気的に加熱した靴下に関する可動性の欠点を克服するために、可搬電源を設け、該電源によつてかかる靴下または足部着用体のヒータを付勢するようにする努力がはらわれた。従来はかかる靴下に用いヒータを付勢するために必要なエネルギが大きいから、着用者の身に付けている蓄電池または電源は比較的に大きなものを用いなければならなかつた。そのために、長い導線またはワイヤを着用者のまわりに延長させる必要があり、それで電源を靴下の中に設置した加熱装置に接続しなければならなかつた。しかしながら、かかる電源は、ヒータを付勢するに必要な蓄電池の大きさの要望事項から比較的にかさばつて重くなり、そして着用者にとつて邪魔になるものであつた。さらにワイヤは電源から延長されなければならないので、靴下はかなりその靴下および関連する電源ユニツトを身に付けている人の運動に邪魔になる。

本発明によれば、靴下はつま先部分と、かかと部分と、連結した脚部分と、靴下を電気的に加熱するための装置とを含み、該加熱装置は該靴下の脚部分に隣接して支承された電気エネルギ源と、該電気エネルギ源と作動的に回路に連結された電気ヒータと、該ヒータに熱伝導関係に連結されて該ヒータの加熱面積を拡げるようになつている熱輻射表面とを含むことを特徴とするものである。

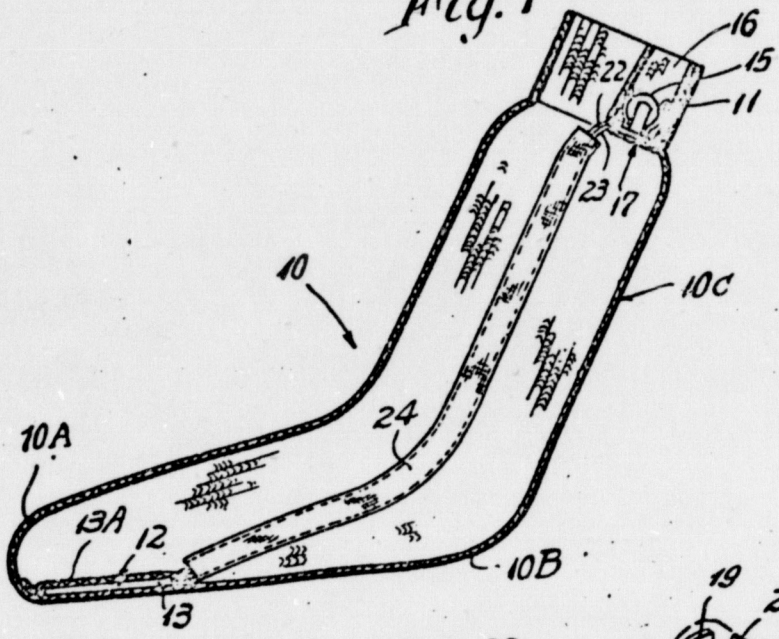
蓄電池の有効寿命を長くするために、回路遮断装置が加熱装置と蓄電池との間の回路に挿間され、該回路遮断装置は実際にサーモスタツトとして作動し、その動力要求量によつて決定されるごとくに、間歇的に回路を断続するようになつている。

本発明の特色は、内蔵した電力源とそれに作動的に接続した加熱装置とを有する電気的に加熱された足部着用体すなわち靴下にある。

本発明の他の特色は、容易に洗たくできる電気加熱靴下にある。

本発明の他の特色は、ヒータの加熱面積をひろげるように熱輻射表面に連結された電気抵抗器を含むヒータ構造体を使用する点にある。

Fig. 1



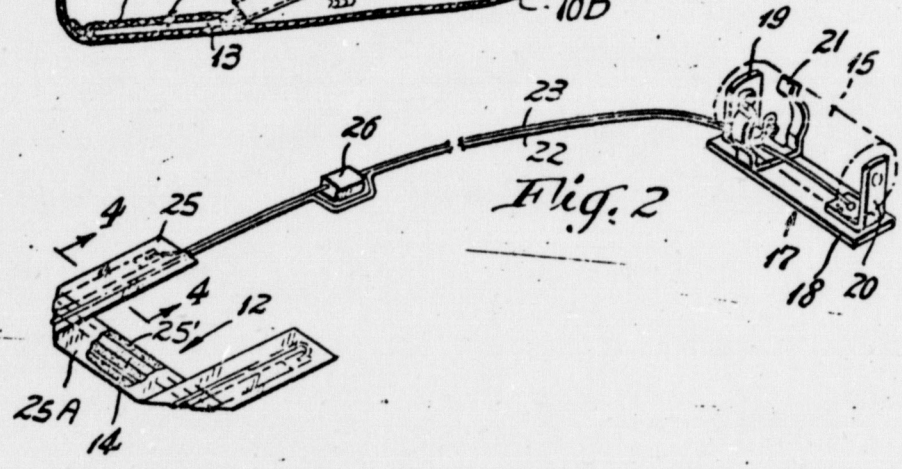


Fig. 2

Fig. 3

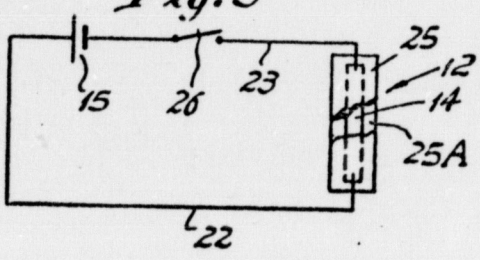


Fig. 4



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Nr. 472 847 PATENTSCHRIFT Nr. 472 847

Internationale Klassifikation: A 41 b 11/00
H 05 b 3/34

SCHWEIZERISCHE EIDGENOSSENSCHAFT
EIDGENÖSSISCHES AMT FÜR GEISTIGES EIGENTUM

Gesuchsnummer: 17116/66
Anmeldungsdatum: 30. November 1966, 18 Uhr

Patent erteilt: 31. Mai 1969
Patentschrift veröffentlicht: 15. Juli 1969

HAUPTPATENT

Raphael J. Costanzo, Bridgeport (Conn., USA)

Elektrisch beheiztes Kleidungsstück

Raphael J. Costanzo, Bridgeport (Conn., USA), ist als Erfinder genannt worden

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Die Erfindung bezieht sich auf ein elektrisch beheiztes Kleidungsstück, insbesondere auf eine Fußbekleidung.

Es sind schon beachtliche Anstrengungen gemacht worden, um eine äußerst wirksame, elektrisch beheizte Fußbekleidung, wie z. B. einen Socken, zum Warmhalten der Füße zu schaffen. Bis jetzt benötigen alle bekannten Vorschläge zur elektrischen Beheizung eines derartigen Sockens eine elektrische Stromquelle, die außerhalb oder vom Socken selbst entfernt war, wie z. B. eine feste Quelle in Form von Haushaltungs- oder Fahrzeugstrom oder in Form einer tragbaren Stromquelle, die auf dem Rücken des Benützers getragen wird. Wenn die Spannung von einer festen elektrischen Stromquelle benützt wurde, wie z. B. zu Hause oder in einem Fahrzeug, war die Beweglichkeit des Trägers derartig beheizter Fußbekleidung notwendigerweise auf die Länge der Schnur oder des Drahtes beschränkt, der zur Zuleitung des Stromes von der festen Stromquelle zum Socken benötigt wurde. Folglich besaßen derartige Socken nur begrenzte Anwendung, wie z. B. während des Schlafes, des Ausruhens oder eines Flugs oder während des Bedienens irgendeines Fahrzeugs, welches die Bewegung des Benützers notwendigerweise beschränkte und wo ausreichend Strom vorhanden war, um die Heizung derartiger Socken zu betreiben.

Zur Beseitigung dieses Mangels derartig elektrisch beheizter Fußbekleidung sind Bemühungen unternommen worden, um ein tragbares Netzteil zu schaffen, mittels dem die Heizung derartiger Socken oder Fußbekleidung gespeist werden kann. Aufgrund der bis jetzt verwendeten Energie zur Beschickung der in derartigen Socken verwendeten Heizung resultierten diese Anstrengungen in der Verwendung einer verhältnismäßig großen Batterie oder eines Netzteils, das vom Benützer um seine Hüfte getragen werden mußte. Aus diesem Grund wurden lange Leiter oder Drähte benötigt, die längs des Körpers des Benützers verliefen, um das Netzteil mit der in den Socken oder der Fußbekleidung liegenden Heizung zu verbinden. Derartige

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Netzteile jedoch waren aufgrund der Größenanforderungen der Batterie, die zur Beschickung derartiger Heizungen benötigt wurde, verhältnismäßig groß, schwer und lästig zu tragen. Außerdem störten die vom Netzteil zum Socken geführten Drähte die Beweglichkeit desjenigen, der solche Socken und das zugehörige Netzteil trug.

Gemäß dieser Erfindung werden diese Nachteile dadurch vermieden, daß die Vorrichtungen zur elektrischen Beheizung eine im Kleidungsstück getragene elektrische Energiequelle umfassen, daß eine elektrische Heizung in den Stromkreis mit der elektrischen Energiequelle geschaltet ist und eine wärmeabstrahlende Oberfläche in wärmeaustauschender Beziehung an die Heizung angeschlossen ist, um die Heizfläche der Heizung zu vergrößern.

Zur Erhaltung der Lebensdauer der Batterie wird zweckmäßig im Stromkreis zwischen dem Heizungswiderstand und der Batterie ein Schalter eingesetzt, der als Thermostat arbeitet und gemäß den Stromanforderungen intermittierend den Stromkreis öffnet und schließt.

Nachfolgend wird anhand der Zeichnung ein Ausführungsbeispiel des Erfindungsgegenstandes beschrieben.

Fig. 1 ist der Querschnitt durch einen erfindungsgemäßen Socken.

Fig. 2 ist die perspektivische Ansicht der elektrischen Heizung und der Energiequelle, die zur Erzeugung derselben benötigt wird.

Fig. 3 ist die schematische Darstellung des elektrischen Stromkreises.

Fig. 4 ist ein Querschnitt der Heizvorrichtung längs Linie 4–4 in Fig. 2.

In den Zeichnungen wird eine erfindungsgemäße Fußbekleidung 10 in Form eines Sockens dargestellt. Der Socken 10 wird gestrickt und besteht im allgemeinen aus einem Zehenteil 10A, einem Fersenabschnitt 10B und einem daran anschließenden Beinteil 10C, an dessen

oberem Ende ein Elastikband 11 oder dergleichen verläuft.

Der Socken 10 wird mittels einer Niederspannungsheizvorrichtung 12 geheizt, die passend innerhalb des Sockens 10 angebracht ist. In der dargestellten Form der Erfindung verläuft die Heizvorrichtung 12 nächst dem Zehenabschnitt 10A des Sockens. Zur Aufnahme der Heizvorrichtung 12 innerhalb des Sockens ist der Abschnitt 10A mit einer Innentasche 13 ausgestattet.

Die Heizung 12, die am besten in Fig. 2 zu sehen ist, wird in die Innentasche 13 eingeführt, die aus der Sohle oder dem Bodenabschnitt des Sockens und einer Materialschicht 13A besteht, die daran anschließend mit der Innenseite des Sockens vernäht wird. Die Heizung 12 besteht aus einem flachen Streifen elektrischen Widerstandsmaterials 14, wie z. B. Nickelchrom. Der Nickelchromstreifen oder Widerstand 14 seinerseits ist an eine geeignete Quelle elektrischer Energie, wie z. B. eine Niederspannungsbatterie 15, angeschlossen, die im Socken 10 selbst getragen werden kann.

In der dargestellten Form der Erfindung wird die Batterie 15 in der im oberen Ende des Sockens ausgebildeten Tasche 16 getragen, die sich vorzugsweise im Elastikbandabschnitt 11 befindet. Die Größe der Tasche 16 ist derart, daß sie ohne weiteres den Batteriehalter 17 und eine kleine Niederspannungsbatterie 15 zum Betrieb der Heizung 12 aufnehmen kann. Der Halter 17 ist so konstruiert, daß die Batterie lösbar darin befestigt werden kann.

Wie am besten in Fig. 2 zu sehen ist, besteht der Batteriehalter 17 aus einem Sockel 18, von dem ein Paar Federlaschen oder Endklemmen 19, 20 abstehen, die so angeordnet sind, um die Endabschnitte der Batterie 15 zu berühren. Ein Federclip 21 ist im Bereich der vorderen Lasche oder der Endklemme 19 angeschlossen oder damit einstückig ausgebildet, wobei er dazu dient, die Batterie 15 wie dargestellt zu fassen. Demgemäß kann die Batetrie ohne weiteres lösbar in den Halter 17 eingeführt werden, indem sie zwischen die Federlaschen 19, 20 und den dazugehörigen Clip 21 eingeschoben wird. Folglich wird die Batterie gegen Längsbewegung formschlüssig von den Federlaschen 19, 20 gegen seitliche Bewegung vom Federclip 21 gehalten.

Geeignete Leiter 22, 23 verbinden die Batterie mit dem Heizelement 12. Somit werden die Enden eines Leiters 23 zwischen den Nickelchromstreifen 14 und die Batterieendklemme 20 geschaltet. Der andere Leiter oder Draht 23 ist an die andere Batterieendklemme 19 und das andere Ende des Nickelchromstreifens 14 angeschlossen. Nachdem die Widerstände so angeschlossen sind, werden sie dem Stromkreis der Batterie zugeschaltet, indem die Batterie in den Halter 17 eingeführt wird. Ein geeignetes angeheftetes Band 24 birgt die Leiter 22, 23 am Beinabschnitt des Sockens.

Die Heizoberfläche des Nickelchromstreifens 14 wird durch Strahlungsvorrichtungen verstärkt, die in wärmeaustauschender Beziehung damit stehen. In der dargestellten Form der Erfindung besteht die Wärmeabstrahlungsvorrichtung aus einem blattförmigen wärmeleitenden Material, wie z. B. der Metallfolie 25, aus Aluminium oder dergleichen, die in wärmeübertragender Beziehung an den Nickelchromstreifen 14 angeschlossen ist. In der dargestellten Ausführungsform verlaufen zwei ähnliche Streifen 25, 25A Rücken an Rücken auf jeder Seite des Widerstandelementes, so daß sie in wärmeaustauschender Beziehung mit diesem stehen und aneinander befestigt werden können. Zur Befestigung der Folie am Widerstand 14 kann auf der Rückseite der Folie ein klebender Überzug ausgebildet sein. Außerdem dient die Klebeschicht auch zur elektrischen Isolierung des Widerstandes gegen die Folie, wogegen die Folie 25, 25A in wärmeaustauschender Beziehung am Widerstand 14 befestigt wird. Die Folie 25, 25A kann auch durch Eloxierung der Folie elektrisch isoliert werden.

Wie dargestellt, kann die Heizfläche oder Oberfläche des Widerstandes 14 um irgendeine erwünschte Breite oder Form ausgedehnt werden, abhängig von der Form und Gestalt der abstrahlenden Streifen 25, 25A. Somit kann anhand eines sehr schnellen Widerstandes die davon abstrahlende Hitze wirkungsvoll über eine verhältnismäßig große Fläche verteilt werden. Folglich ist die erzeugte Wärme nicht auf einen einzigen Punkt beschränkt, sondern wird zwecks gleichmäßiger Erwärmung bequem verteilt.

Aus der dargestellten Form der Erfindung ist ohne weiteres ersichtlich, daß die Heizung 12 anfänglich als längliches Teil ausgebildet war, das anschließend zur Bildung der U-förmigen Heizung 12 gefaltet wurde, die ohne weiteres in die Zehentasche 13 des Sockens 10 eingeführt werden kann.

Bei der Einführung der Batterie 15 zwischen die Endklemme 19, 20 des Batteriehalters wird der Stromkreis der Heizung gespeist.

Gegebenenfalls kann ein geeigneter Schalter (nicht dargestellt) in Serie zwischen die Batterie 15 und das Heizelement 12 geschaltet werden, um so die Speisung des Stromkreises zu steuern.

Wie gezeigt, ist eine Vorrichtung zur Verlängerung der Batterielebensdauer vorgesehen. Die Erfahrung hat gezeigt, daß die von der Heizung zu erzeugende benötigte Temperatur nur etwas höher zu sein braucht als die normale Körpertemperatur, um die Füße warm zu halten. Aus diesem Grund braucht die Heizung nicht dauernd in Betrieb zu sein, weshalb der Heizungsstromkreis zu- und abgeschaltet wird, wie die Körpertemperatur oder der Bedarf des Benützers dies bedingt. Dies wird dadurch erreicht, daß ein automatisch arbeitender Schalter 26 bekannter Konstruktion in die Leitung zwischen die Batterie 15 und die Heizung geschaltet wird. Der Schalter ist so konstruiert, daß er als Thermostat wirkt, um den Stromkreis zur Heizung gemäß den Stromanforderungen intermittierend zu öffnen und zu schließen. Durch Verwendung des aussetzenden Betriebs wurde die Erfahrung gemacht, daß die Lebensdauer der Batterie 15 wesentlich erhöht werden kann.

Die beschriebene Heizung 12 ist so angeordnet und konstruiert, um von einer Batterie mit sehr niedriger Spannung betrieben werden zu können. Es können entweder drei oder vier 1½-Volt-Batterien oder eine 3-Volt-Batterie zum zufriedenstellenden Betrieb der Heizung 12 verwendet werden. Außerdem können auch 2 D-Zellenbatterien zur Speisung der Heizung 12 verwendet werden.

Aus dem vorhergehenden ist ohne weiteres ersichtlich, daß die beheizte, beschriebene Fußbekleidung 10 aus einer vollkommen in sich abgeschlossenen Einheit besteht, in der die Stromquelle 15 und die Heizung 12 vollständig innerhalb des Gefüges des Sockens 10 untergebracht werden können. Der gesamte Socken 10 ist verhältnismäßig leicht und kann, wenn er benützt wird, mit der Bequemlichkeit und dem Luxus eines gewöhn-

lichen Sockens getragen werden. Folglich braucht der Benützer keinerlei unmäßig großes Netzteil zu schleppen, das ohne weiteres anderen Personen auffällt. Die beschriebene Erfindung besitzt die Erscheinung und den Komfort herkömmlicher Fußbekleidung, mit dem Unterschied, daß zum zusätzlichen Komfort in großer Kälte eine Wärmequelle vorgesehen ist. Demgemäß ist der beheizte Socken besonders geeignet als Sportbekleidung, wie z. B. beim Jagen und/oder Fischen in der kalten Jahreszeit, und er kann so getragen werden, daß er auf keinerlei Weise die Bewegungen des Trägers stört. Außerdem ist das Gesamtgewicht auf ein Mindestmaß reduziert.

Obwohl die vorliegende Erfindung insbesondere unter Anwendung auf einen elektrisch beheizten Socken dargestellt ist, ist ohne weiteres offensichtlich, daß die neuartige Heizungsvorrichtung auf andere Bekleidungsstücke und/oder Anwendungen ausgedehnt werden kann. Deshalb ist es selbstverständlich, obwohl die vorliegende Erfindung in bezug auf einen beheizten Socken offenbart und beschrieben worden ist, daß Abänderungen vorgenommen werden können, ohne vom Inhalt oder Geltungsbereich der Erfindung abzuweichen.

PATENTANSPRUCH

Elektrisch beheiztes Kleidungsstück, insbesondere Fußbekleidung, dadurch gekennzeichnet, daß die Vorrichtungen zur elektrischen Beheizung eine im Kleidungsstück getragene elektrische Energiequelle umfassen, daß eine elektrische Heizung in den Stromkreis mit der elektrischen Energiequelle geschaltet ist und eine wärmeabstrahlende Oberfläche in wärmeaustauschender Beziehung an die Heizung angeschlossen ist, um die Heizfläche der Heizung zu vergrößern.

UNTERANSPRÜCHE

1. Socken nach Patentanspruch, mit einem Zehenabschnitt, einem Fersenabschnitt und einem damit verbundenen Beinabschnitt, gekennzeichnet durch eine nächst dem oberen Ende des Beinabschnittes liegende Tasche, die eine Niederspannungsbatterie aufnimmt, eine nur im Zehenabschnitt angeordnete Heizung, welche einen Streifen aus elektrischem Widerstandsmaterial aufweist, elektrische Leiter zum Verbinden des Streifens mit der Batterie und Mittel zum Befestigen der Leiter am Beinabschnitt.

2. Socken nach Unteranspruch 1, dadurch gekennzeichnet, daß eine Tasche im Zehenabschnitt des Sokkens gebildet ist und sowohl die Heizung als auch die damit verbundene Abstrahlungsoberfläche in dieser Zehentasche angeordnet sind.

3. Socken nach Unteranspruch 1, dadurch gekennzeichnet, daß die Tasche lösbar die Niederspannungsbatterie aufnimmt.

4. Elektrisch beheizbares Kleidungsstück nach Patentanspruch, dadurch gekennzeichnet, daß die Heizung ein niederspanniges elektrisches Widerstandselement enthält.

5. Elektrisch beheizbares Kleidungsstück nach Patentanspruch oder Unteranspruch 4, dadurch gekennzeichnet, daß die elektrische Energiequelle aus einer Batterie mit niedriger Spannung von weniger als 6 Volt besteht.

6. Elektrisch beheizbares Kleidungsstück nach Patentanspruch, dadurch gekennzeichnet, daß die wärmeabstrahlende Oberfläche elektrisch gegen das Heizungselement isoliert ist.

7. Elektrisch beheizbares Kleidungsstück nach Patentanspruch, dadurch gekennzeichnet, daß die Heizung einen flachen Streifen aus elektrischem Widerstandsmaterial enthält.

8. Elektrisch beheizbares Kleidungsstück nach Patentanspruch und Unteranspruch 7, dadurch gekennzeichnet, daß die Strahlungsoberfläche wärmeleitende Streifen enthält, die Rücken an Rücken angeordnet sind, um das Heizungselement dazwischen aufzunehmen.

9. Elektrisch beheizbares Kleidungsstück nach Patentanspruch und Unteransprüchen 6 bis 8, dadurch gekennzeichnet, daß die Abstrahlungsoberflächen klebebeschichtete metallische Folienstreifen enthalten, die klebend am Heizelement befestigt sind, wobei die Klebeschicht den Folienstreifen elektrisch gegen das Heizelement isoliert, ohne nachteilig auf die dazwischen zustande kommenden Wärmeaustauschbeziehung einzuwirken.

10. Elektrisch beheizbares Kleidungsstück nach Patentanspruch, dadurch gekennzeichnet, daß ein Leistungsschalter in den Stromkreis zum Heizelement eingebaut ist, um den Stromkreis zum Widerstand zu schließen und zu unterbrechen.

Raphael J. Costanzo
Vertreter: Bovard & Cie., Bern

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Fig. 1

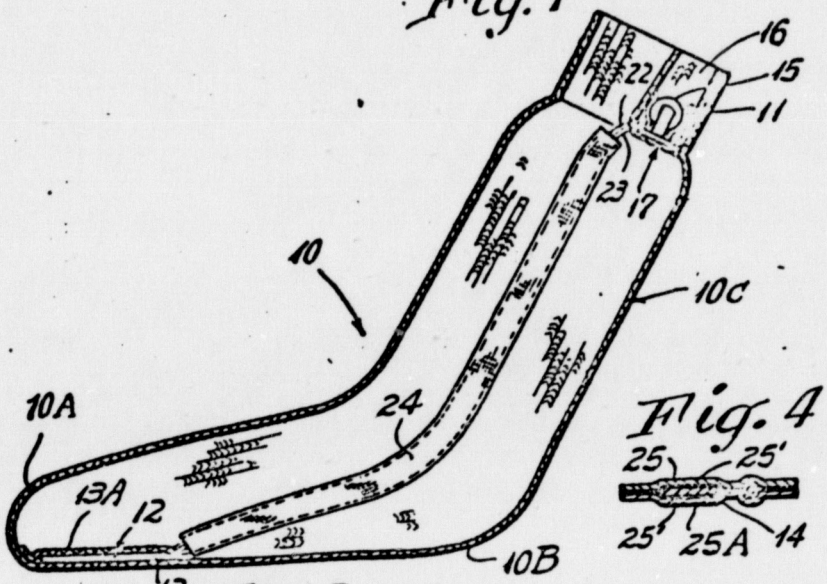


Fig. 4

Fig. 3

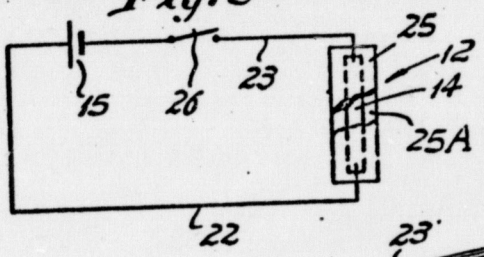
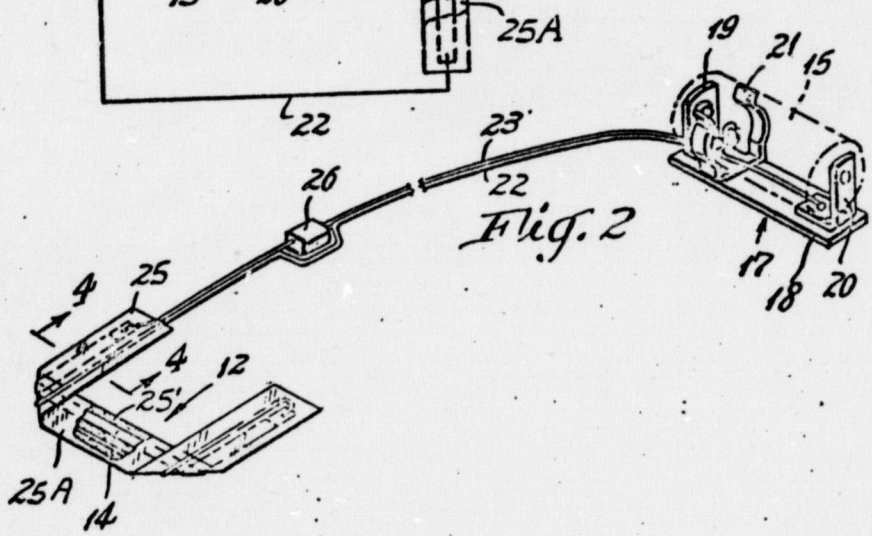


Fig. 2



(3.954)

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PLAINTIFF'S EXHIBIT 243 IDEN. 11864 Civil

RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE L'INDUSTRIE

SERVICE de la PROPRIÉTÉ INDUSTRIELLE

BREVET D'INVENTION

N° 153

P. V. n° 84.698

Classification internationale : A 41 b

N° 1.501.533

Chaussette à chauffage électrique.

M. RAPHAEL JOSEPH COSTANZO résidant aux États-Unis d'Amérique.

Demandé le 23 novembre 1966, à 16h 9m, à Paris.
Délivré par arrêté du 2 octobre 1967.
(*Bulletin officiel de la Propriété industrielle*, n° 45 du 10 novembre 1967.)

La présente invention se rapporte en général à un article chaussant chauffé électriquement, et plus spécialement à une chaussette à chauffage électrique comportant un circuit comprenant une source d'énergie électrique et un élément de chauffage dont le fonctionnement est lié à celle-ci et qui sont totalement contenus dans la chaussette.

Des efforts considérables ont été accomplis pour réaliser un article chaussant chauffé électriquement très efficace, comme par exemple une chaussette, pour tenir les pieds chauds. Jusqu'ici tous les efforts connus tendant à chauffer électriquement une telle chaussette exigeaient une source d'énergie électrique qui était étrangère ou placée loin de la chaussette elle-même, par exemple une source fixe, telle que de l'énergie à domicile ou provenant d'un véhicule, ou un bloc d'alimentation portatif porté sur le corps de l'individu. Quand on utilisait le courant de circuit provenant d'une source fixe d'énergie électrique, située par exemple au logis ou dans un véhicule, la mobilité de la personne portant une telle chaussette ou un tel article chaussant chauffé se limitait nécessairement à la longueur du cordon ou fil métallique nécessaire pour amener le courant de la source fixe à la chaussette. En conséquence, ces chaussettes ne comportaient qu'un emploi limité, comme par exemple pour dormir, se reposer ou pour voler en avion ou conduire quelqu'autre véhicule dans lequel le mouvement du porteur était nécessairement restreint et dans le cas où une énergie suffisante était disponible pour alimenter l'élément de chauffage de ces chaussettes.

Pour parer à la gêne dans la mobilité provenant de telles chaussettes ou articles chaussants chauffés électriquement, des efforts ont été accomplis pour fournir un bloc d'alimentation portatif par lequel l'élément chauffant de ces chaussettes ou de ces articles chaussants puisse être alimenté. Par suite de l'énergie requise jusqu'ici pour alimenter l'élément chauffant utilisé pour de telles chaussettes, de tels efforts se traduisaient par l'utilisation d'une pile de dimensions relativement grandes ou d'un bloc d'alimentation qui devaient être portés par l'utilisateur à sa ceinture. Pour ce motif, il était nécessaire que de longs conducteurs ou fils métalliques s'étendent le long du corps de l'utilisateur pour relier le bloc d'alimentation au dispositif de chauffage disposé à l'intérieur de la chaussette ou de l'article chaussant. De tels blocs d'alimentation, en raison des nécessités des dimensions de la batterie requise pour alimenter de tels éléments de chauffage, étaient relativement volumineux, lourds et encombrants à porter. Egalement, les fils métalliques nécessaires sortant du bloc d'alimentation et de la chaussette entravaient la mobilité de la personne portant ces chaussettes et cet ensemble de bloc d'alimentation associé.

Selon la présente invention, la chaussette comprend une partie formant bout, une partie formant talon, et une partie assemblée formant jambe, un dispositif servant à chauffer électriquement cette chaussette, qui est caractérisée en ce que ce dernier dispositif comprend une source d'énergie électrique portée près de sa partie formant la jambe, un élément de chauffage électrique dont le circuit de fonctionnement est relié à cette source d'énergie électrique, et une surface rayonnant la chaleur reliée à l'élément chauffant de façon à en recevoir de la chaleur pour étendre la zone de chauffage de cet élément.

Pour préserver la durée de service de la pile, on interpose un dispositif de rupture de circuit dans la ligne entre le dispositif de chauffage et la pile, qui fonctionne en réalité comme un thermostat, en coupant et établissant le circuit par intermittence selon les besoins en énergie de celui-ci.

La présente invention se propose en conséquence de fournir :

Un article chaussant ou une chaussette chauffés électriquement et comportant une source d'énergie électrique indépendante et un dispositif de chauffage dont le fonctionnement est lié à celle-ci;

Une chaussette chauffée électriquement qui se lave facilement;

Une construction de l'élément chauffant qui comprend une résistance électrique à laquelle sont associées des surfaces rayonnant la chaleur de façon à étendre la zone de chauffage de l'élément chauffant;

Un élément chauffant perfectionné qui peut être alimenté par une pile à très basse tension;

[1.501.533]

Une chaussette chauffée électriquement ou article semblable que l'on peut porter avec tout le confort et toute la commodité des chaussettes ou articles chaussants ordinaires.

D'autres caractéristiques et avantages de la présente invention ressortiront de la description qui va suivre, faite en regard du dessin annexé et donnant, à titre explicatif mais nullement limitatif, une forme de réalisation conforme à l'invention.

Sur ce dessin :

La figure 1 est une vue latérale en coupe d'une construction de chaussette mettant en œuvre la présente invention;

La figure 2 est une vue en perspective de l'élément chauffant électrique perfectionné et de la source d'énergie nécessaire à son alimentation, tels qu'ils sont utilisés dans la chaussette de la figure 1;

La figure 3 est un schéma du circuit électrique utilisé dans la construction de chaussette de la figure 1;

La figure 4 est une vue en coupe du dispositif de chauffage suivant la ligne 4-4 de la figure 2.

En se reportant au dessin, on y voit représentée une construction perfectionnée 10 d'article chaussant selon la présente invention, qui est représentée ici comme étant une chaussette. La chaussette 10 peut être façonnée de façon classique, c'est-à-dire tissée ou tricotée, et se compose généralement d'une partie de bout 10A, d'une partie de talon 10B et d'une partie de jambe assemblée 10C comportant une bande élastique 11 ou semblable voisine de son extrémité supérieure.

Selon la présente invention, la chaussette 10 est chauffée électriquement au moyen d'un dispositif de chauffage à basse tension 12 placé de façon appropriée à l'intérieur de la chaussette 10. Dans la forme de l'invention représentée, le dispositif de chauffage 12 est placé près de la partie de bout 10A de la chaussette. Pour adapter le dispositif de chauffage 12 à l'intérieur de la chaussette, on forme dans celle-ci une poche intérieure 13 dans la partie de bout 10A.

Le dispositif de chauffage 12, comme on le voit en particulier sur la figure 2, s'introduit facilement dans la poche 13 qui est formée par la semelle ou partie inférieure de la chaussette et par une couche de matière 13A qui est cousue près de celle-ci sur la surface intérieure de la chaussette. Le dispositif de chauffage 12 est constitué par une bande plate en matière constituant une résistance électrique 14, comme par exemple le nickel-chrome. La bande en nickel-chrome ou résistance 14 est à son tour reliée en circuit avec une source convenable d'énergie électrique comme par exemple une pile à basse tension 15 qui est destinée à être portée dans la chaussette 10 elle-même.

Dans la forme de l'invention représentée, la pile 15 est portée dans la poche 16 formée dans l'extrémité supérieure de la chaussette, et de préférence dans la partie 11 formée par une bande de celle-ci. La dimension de la poche 16 est telle qu'elle peut recevoir le porte-pile 17 et une petite pile à basse tension 15 servant à alimenter l'élément chauffant 12 comme décrit plus loin. Le porte-pile 17 est construit de façon à pouvoir y fixer la pile et à pouvoir l'en dégager.

Comme on le voit en particulier sur la figure 2, le porte-pile 17 est constitué par une embase 18 à laquelle est reliée une paire de doigts formant ressort ou bornes 19, 20 qui sont agencés de façon à venir en contact avec les parties formant bornes de la pile 15. Reliée au doigt ou à la borne avant 19, ou façonnée d'une seule pièce avec ceux-ci, se trouve une pince élastique 21 qui sert à contenir les parties latérales de la pile 15 comme on le voit. La pile 15 peut, en conséquence être facilement fixée au support 17 de façon à pouvoir en être dégagée en la plaçant entre les doigts formant bornes 19, 20 et la pince associée 21. En conséquence, la pile est empêchée par le frottement de se déplacer longitudinalement au moyen des bornes à doigts élastiques 19, 20 et de se déplacer latéralement par la partie élastique formant pince 21.

Des conducteurs appropriés 22, 23 mettent la pile en circuit avec l'élément chauffant 12. En conséquence, les extrémités de l'un des conducteurs 23 sont connectées entre la bande en nickel-chrome 14 et la borne de pile 20. L'autre conducteur ou fil métallique 23 est relié à l'autre borne de pile 19 et à l'autre extrémité de la bande en nickel-chrome 14. Les résistances étant ainsi connectées, on les met en circuit avec la pile lorsqu'on place celle-ci dans le support 17. Une gaine 24 cache ou couvre les conducteurs 22, 23 disposés contre la partie de jambe de la chaussette.

La surface chauffante de la bande en nickel-chrome 14 est augmentée par un dispositif de rayonnement qui lui est relié de façon que la chaleur lui soit transmise. Dans la forme de l'invention représentée, le dispositif de rayonnement de chaleur est constitué par une feuille de matière conductrice de chaleur, comme par exemple, une feuille mince de métal 25, telle que du clinquant d'aluminium ou matière semblable, qui est reliée à la bande en nickel-chrome 14 de façon que celle-ci lui transmette la chaleur. Dans la forme de réalisation représentée, on peut disposer en les plaçant dos à dos de chaque côté de l'élément résistant deux bandes semblables 25, 25A, de façon à les fixer à celui-ci en relation de transmission de chaleur avec lui et l'une avec l'autre. Un moyen approprié servant à fixer la feuille de métal à la résistance 14 peut consister à appliquer un revêtement adhésif au dos de la feuille. En conséquence, le suppport adhésif agit également pour isoler électriquement la résistance électrique de la feuille de métal tout en fixant en même temps la feuille 25, 25A à la résistance 14 qui lui transmet la chaleur. La feuille de métal 25, 25A peut être également isolée électriquement en étant soumise à une oxydation anodique.

Comme on le voit, la zone ou la surface de chauffage de la résistance 14 peut être augmentée jusqu'à n'importe quelle largeur ou forme voulue selon la configuration et la forme des bandes rayonnantes 25, 25A. Ainsi, avec une résistance très étroite, la chaleur qui en émane peut être efficacement distribuée sur une étendue relativement grande. La chaleur produite n'est par conséquent pas limitée à un seul point, mais est distribuée agréablement en vue d'un chauffage uniforme.

On se rend compte facilement que, dans la forme de l'invention représentée, le dispositif de chauffage 12 avait primitivement la forme d'un élément allongé que l'on a plié par la suite pour former l'élément chauffant 12 en forme d'U que l'on introduit facilement dans la poche 13 du bout de la chaussette 10.

On notera que pendant le fonctionnement, chaque fois que l'on interpose la pile 15 entre les bornes 19, 20 du porte-pile, on alimente le circuit jusqu'à l'élément chauffant.

A volonté, on peut brancher en série un commutateur approprié (non représenté) entre la pile 15 et l'élément de chauffage 12 de façon à commander le fonctionnement du circuit.

Selon la présente invention, on fournit un moyen servant à prolonger la durée de service de la pile. L'expérience a montré que la température nécessaire que doit produire l'élément de chauffage n'a seulement besoin que d'être légèrement supérieure à celle qui est normale pour le corps afin de maintenir les pieds d'un individu chauds. Pour cette raison, la demande d'énergie servant à alimenter l'élément de chauffage n'a pas besoin d'être constante. Pour ce motif, on peut faire fonctionner le circuit de l'élément chauffant par intermittence, suivant la température du corps ou la demande de la personne qui le porte. On y parvient en interposant un interrupteur de circuit 26 fonctionnant automatiquement et de construction connue dans la ligne entre la pile 15 et l'élément chauffant. En conséquence, l'interrupteur de circuit est construit de façon à fonctionner comme un thermostat afin d'établir et de rompre par intermittence le circuit aboutissant à l'élément chauffant selon les demandes d'énergie. En conséquence, on s'est rendu compte qu'en utilisant un fonctionnement intermittent, on pouvait prolonger sensiblement la durée de service de la pile 15.

Le dispositif de chauffage 12 décrit est agencé et construit pour fonctionner avec une batterie à très basse tension. Par exemple, on peut utiliser trois ou quatre piles de 1,5 volt pour alimenter l'élément chauffant, ou une pile de 3 volts peut alimenter de façon satisfaisante l'élément chauffant 12. On peut également utiliser 2 éléments de piles sèches pour alimenter l'élément chauffant.

D'après ce qui précède, on constate aisément que l'article chaussant chauffé 10 décrit est constitué par un ensemble entièrement logé dans lequel la source d'énergie 15 et l'élément chauffant 12 peuvent être disposés en totalité à l'intérieur de la structure de la chaussette 10 elle-même. Celle-ci est d'un poids relativement léger et lorsqu'on la porte elle présente la commodité et le luxe d'une chaussette ordinaire. En conséquence, le porteur n'est pas obligé de porter d'ensemble volumineux de bloc d'alimentation quelconque qui puisse être facilement aperçu par une autre personne. Avec l'invention décrite, l'article chaussant présente toute l'apparence et tout le confort d'un article chaussant classique, mais avec la caractéristique supplémentaire consistant en ce qu'on met en œuvre une source de chaleur pour ajouter un confort en plus par froid extrême. En conséquence, la chaussette chauffée s'utilise particulièrement comme article pour le sport, par exemple pour la chasse et/ou pour la pêche par temps froids, ou pour des climats froids, et elle peut être portée de façon à ne gêner en aucune manière les mouvements de la personne qui la porte. Son poids total est également réduit à un minimum.

Bien que la présente invention ait été définie spécialement comme s'appliquant à une chaussette chauffée électriquement, on se rend facilement compte que le nouveau dispositif de chauffage peut s'appliquer aisément à d'autres vêtements pour chauffer le corps et/ou à d'autres utilisations.

En conséquence, il va de soi que la présente invention n'a été décrite ci-dessus qu'à titre explicatif mais nullement limitatif et que l'on pourra y apporter toutes variantes sans sortir de son cadre.

RÉSUMÉ

Chaussette chauffée électriquement, caractérisée par les points suivants pris séparément ou en combinaisons :

1° Elle comporte une partie de bout, une partie de talon et une partie assemblée formant jambe, un dispositif servant à la chauffer électriquement constitué par une source d'énergie électrique portée près de sa partie de jambe, un élément chauffant électrique relié en circuit avec cette source d'énergie électrique et une surface rayonnant la chaleur reliée à cet élément chauffant de façon que celui-ci lui transmette la chaleur afin d'étendre la zone de chauffage de cet élément chauffant;

2° L'élément chauffant comprend une résistance électrique, pour basse tension;

3° La source d'énergie électrique est constituée par une pile à basse tension de moins de six volts;

4° La surface rayonnant la chaleur est isolée électriquement de l'élément chauffant;

5° Cet élément chauffant comprend une bande plate de matière électriquement résistante;

6° Cette surface rayonnante comprend des bandes conductrices de chaleur disposées dos à dos afin de serrer entre elles cet élément chauffant;

7° Ces surfaces rayonnantes comprennent une bande de feuille mince en métal à support fixée par

un adhésif à l'élément chauffant, ce support adhésif isolant électriquement la bande en feuille métallique mince de cet élément chauffant sans exercer d'influence défavorable sur la transmission de chaleur entre ceux-ci;

8° On dispose un interrupteur de circuit dans le circuit dirigé vers l'élément chauffant afin d'établir et de rompre par intermittence le circuit allant à la résistance;

9° Une petite poche est assemblée près de la partie supérieure de la partie de jambe et est destinée à fixer de façon amovible la source d'énergie électrique;

10° Un dispositif formant poche est formé dans la partie de bout, et l'élément chauffant ainsi que la surface rayonnante qui lui est assemblée sont engagés dans cette poche de bout.

RAPHAEL JOSEPH COSTANZO

Par procuration :

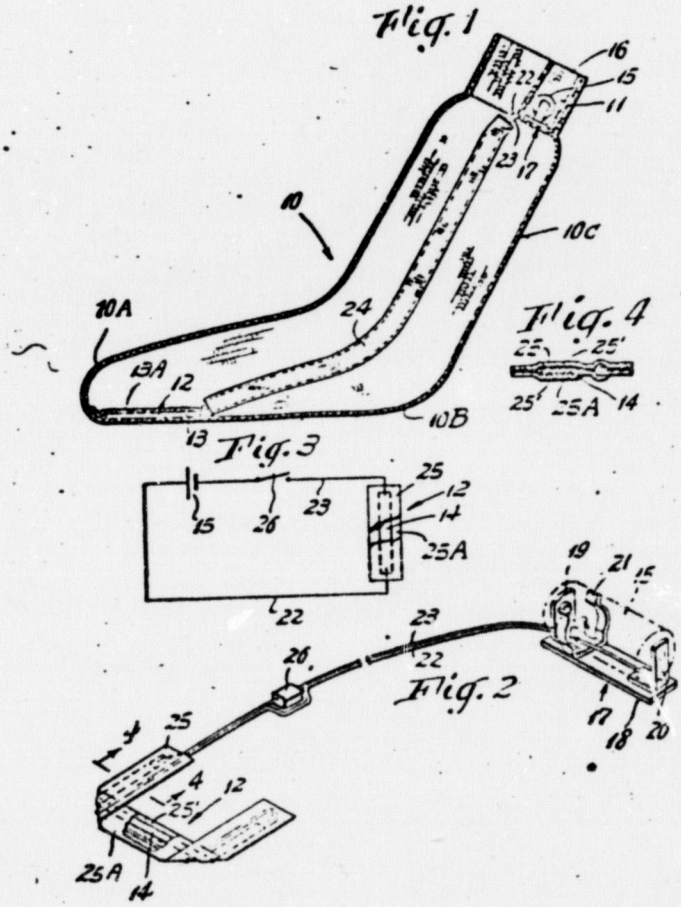
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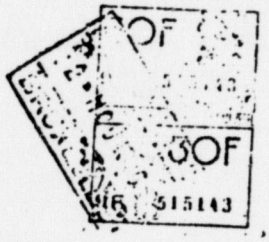
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US 487.011

PLAINTIFF'S EXHIBIT
IDEN.
11864 Civil



BREVET D'INVENTION

"Chaussette à chauffage électrique"

Raphael Joseph COSTANZO

Des demandes de brevet correspondantes ont été déposées aux Etats-Unis d'Amérique le 13 Septembre 1965 sous le Nº 487.011 et en France le 23 Novembre 1966 sous le Nº PV. 84.698 .

La présente invention se rapporte en général à un article chaussant chauffé électriquement, et plus spécialement à une chaussette à chauffage électrique comportant un circuit comprenant une source d'énergie électrique et un élément de chauffage dont le fonctionnement est lié à celle-ci et qui sont totalement contenus dans la chaussette.

Des efforts considérables ont été accomplis pour réaliser un article chaussant chauffé électriquement très efficace, comme par exemple une chaussette, pour tenir les pieds chauds. Jusqu'ici tous les efforts connus

Raphael Joseph COSTANZO.

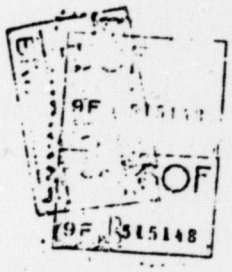


Fig. 1

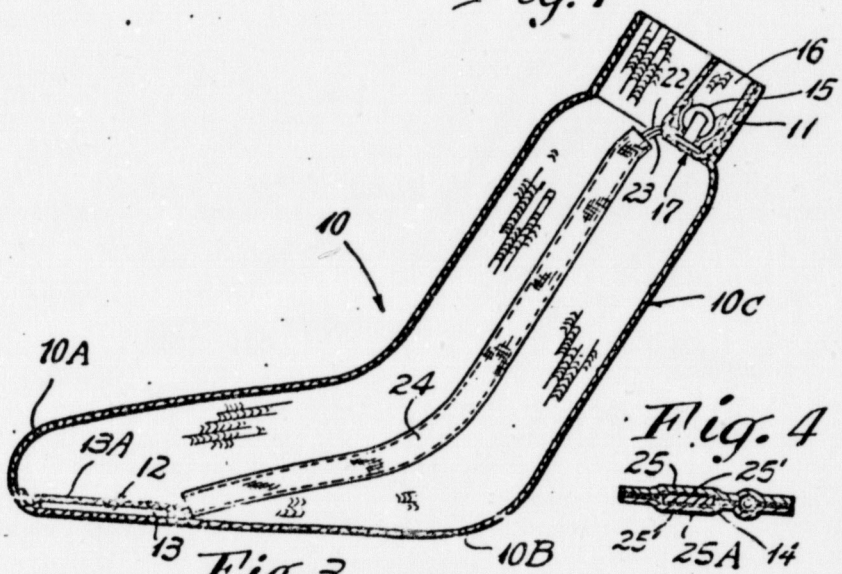


Fig. 4

Fig. 3

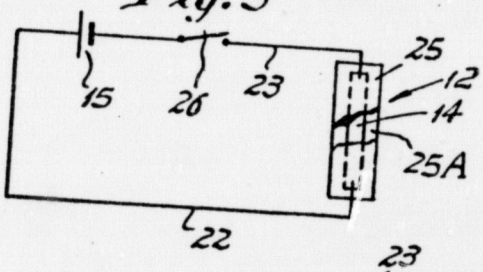
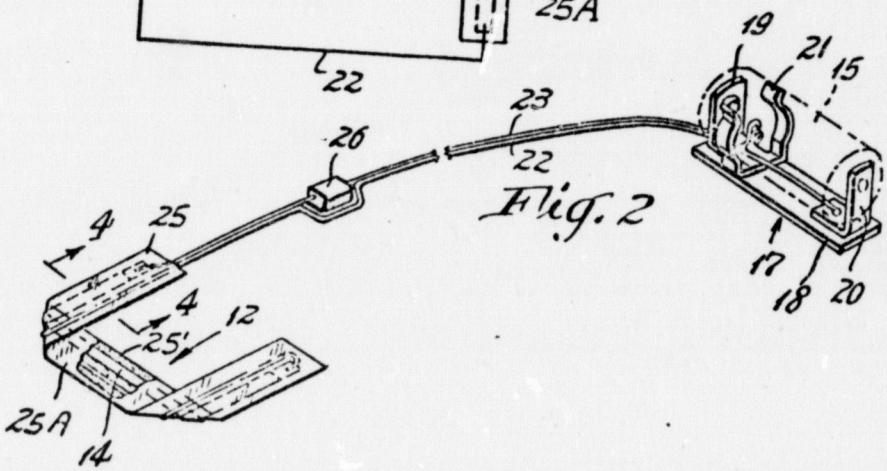


Fig. 2



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Bruxelles, le 28 novembre 1966.
P. Pon. Raphael Joseph COSTANZO.

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NORGE

Patent nr. 121201

Int. Cl. H 05 b 3/34 Kl. 21h-2/03

STYRET
FOR DET INDUSTRIELLE
RETTSVERN

Patentsøknad nr. 165.411 Inngitt 1.XI 1966
Løpedag –
Søknaden alment tilgjengelig fra 1.VII 1968
Søknaden utlagt og utlegningsskrift utgitt 8.II 1971
Patent meddelt 19.V 1971
Prioritet begjært fra: –

Raphael J. Costanzo,
119 Park Street, Bridgeport, Conn., USA.

Oppfinner: Søkeren.

Fullmektig: A/S Bergen Patentkontor Patentingeniør Thor Ringvold.

Sokk utstyrt med elektriske varmeorganer.

Den foreliggende oppfinnelse vedrører en sokk utformet i ett stykke med en tådel, en hældel og en leggdel, samt utstyrt med elektriske varmeorganer, hvilke varmeorganer omfatter et lavvolts elektrisk motstandselement forbundet over en elektrisk strømkrets med en spenningskilde på seks volt eller mindre, anbrakt i nærheten av sokkens leggdel.

Betraktelige anstrengelser er blitt gjort for å komme frem til et effektivt elektrisk oppvarmet fottøy, for eksempel en sokk til å holde føtter varme. Alle tidligere kjente anstrengelser for å oppvarme en slik sokk elektrisk krevet en fremmed elektrisk kraftkilde eller en kraftkilde som var plassert fjernt fra selve sokken, for eksempel en fast kilde, slik som lysnett eller et kjøretøys strømforsyning, eller en transportabel kraftkilde som

ble båret på vedkommende kropp. Når det ble benyttet strøm fra en fast elektrisk kraftkilde, for eksempel hjemme eller i et kjøretøy, ble nødvendigvis bevegeligheten til den person som benyttet slikt oppvarmet fottøy begrenset til snorlengden eller ledningslengden som trengtes til å føre strømmen fra den faste kraftkilden til sokken. Slike sokker hadde følgelig bare begrensete anvendelsesmuligheter, for eksempel ved søvn, hvile eller ved flyturer eller betjening av et annet kjøretøy hvor bærerens bevegelse nødvendigvis var innskrenket og hvor tilstrekkelig kraft til å gi energi til sokkenes varmeelement var for hånden.

For å få bort ulempene knyttet til slike elektriske oppvarmete sokkers bevegelighet er det blitt gjort anstrengelser for å skaffe en transportabel kraftforsyningsenhet som kan gi energi til slike sokkers eller fottøys varmeelement. På grunn av den energi som tidligere trengtes til å drive varmeelementet som ble benyttet i slike sokker, resulterte slike anstrengelser i at det ble benyttet et forholdsvis stor-proporsjonert batteri eller kraftforsyningsenhet som bæreren måtte bære om livet. Av denne grunn krevdes det lange ledere eller ledninger som gikk langs bærerens kropp for å forbinde kraftforsyningsenheten til varmeanordningene som var plassert i sokken eller fottøyet. Slike kraftforsyningsenheter var imidlertid forholdsvis store, tunge og besværlige å bære på grunn av det plassbehov batteriene hadde som trengtes for å drive slike varmeelement. Også ledningene som måtte gå fra kraftforsyningsenheten og sokken forstyrret bevegeligheten til vedkommende som bar slike sokker og den tilknyttete kraftforsyningsenhet betraktelig.

I US-patentskrift nr. 3.079.486 er det vist en sokk hvor det i avstander over hele sokkens utstrekning er fordelt en varmeledning, hvor selve ledningsforløpet bestemmer varmefordelingen. Som følge av det omfattende ledningsforløp kan det ikke benyttes en lavvolts energikilde.

Formålet med den foreliggende oppfinnelse er å komme frem til en sokk hvor det kan benyttes en lavvolts energikilde og allikevel kan oppnås en effektiv varmefordeling over et større område av sokken.

Sokken ifølge oppfinnelsen er kjennetegnet ved at varmeorganet er plassert i sokkens tåspiss og at en varmeoppredeflate som er forbundet i varmeledende forbindelse med det udekkete elektriske motstandselement har en ytterflate større enn det udekkete mot-

standselements ytterflate for å fordele varmen frembrakt av det elektriske motstandselement over et utvidet område.

Det foretrekkes at varmespredeflaten er elektrisk isolert fra varmeelementet.

Varmeelementet kan bestå av en flat strimmel av elektrisk motstandsmateriale.

Varmespredeflaten kan omfatte varmeledende strimler plassert flate mot flate på hver sin side av varmeelementet.

Det foretrekkes at varmespredeflaten omfatter på baksiden klebemiddelovertrukne metallfoliestrimler som er festet til varmeelementet ved hjelp av klebemidlet og at klebemidlet danner elektrisk isolasjon mellom foliestrimlen og varmeelementet uten å påvirke varmeledningsforholdet mellom disse vesentlig.

Videre kan det være plassert en bryter i varmeelementets krets for med mellomrom å slutte og bryte strømkretsen til varmeelementet.

Det kan være utformet en lommedannende anordning i sokkens tådel for opptakelse av varmeelementet og den tilknyttete varmespredeflate inne i tålommen.

Ytterligere trekk ved oppfinnelsen vil fremgå av den etterfølgende beskrivelse under henvisning til de medfølgende tegninger, hvori:

Fig. 1 viser i sideriss et snitt gjennom en sokk-konstruksjon som er et eksempel på den foreliggende oppfinnelse.

Fig. 2 viser et perspektivriss av det forbedrete elektriske varmeelement og kraftkilden som trenges for å drive den samme, slik som den er anvendt i den sokk-konstruksjonen som er vist i fig. 1.

Fig. 3 viser skjematisk den elektriske kretsen som er anvendt i sokk-konstruksjonen i fig. 1.

Fig. 4 viser et snitt 4-4 gjennom varmeelementet i fig. 2.

Det henvises til tegningene hvor det som eksempel på den foreliggende oppfinnelse er vist en forbedret fottøy-konstruksjon 10, her vist i form av en sokk. Sokken 10 kan være laget på vanlig måte, det vil si vevet eller strikket, og omfatter vanligvis en tådel 10A, en hældel 10B og en tilknyttet leggdel 10C med en elastisk bord 11 langs dens øverste kant.

Ifølge den foreliggende oppfinnelse blir sokken 10 elektrisk oppvarmet ved hjelp av et lavspent varmeelement 12 passende plassert inne i sokken 10. I oppfinnelsens viste form er varmeelementet 12 plassert inntil sokkens tådel 10A. For å skaffe plass for

varmeelementet 12 inne i sokken er der dannet en innvendig lomme 13 i tådelen 10A.

Varmeelementet 12 innsettes, som det best sees i fig. 2, lettvint i lommen 13 som er begrenset av sålen eller sokkens bunndel og et lag av stoff 13A som er sydd til denne på innsiden av sokken. Varmeelementet 12 omfatter en flat strimmel elektrisk motstandsmateriale 14, for eksempel konstantan. Konstantanstrimlen eller motstanden 14 er i sin tur forbundet med en passende elektrisk kraftkilde, for eksempel et lavspent batteri 15 som er innrettet til å bli båret i selve sokken 10.

I oppfinnelsens viste form blir batteriet 15 båret i lommen 16 som er dannet i sokkens øverste ende, fortrinnsvis i dennes bord 11. Størrelsen på lommen 16 er slik at den lett kan romme batteriholderen 17 og et lite lavspent batteri 15 til å drive varmeelementet 12 som vil bli beskrevet i det følgende. Holderen 17 er konstruert slik at batteriet kan festes løsbart til denne.

Som det vil fremgå best av fig. 2, omfatter batteriholderen 17 en grunndel 18 i hvilken det er festet et par fjærende fingre eller polklemmer 19, 20 som er plassert slik at de kommer i kontakt med polene på batteriet 15, Tilknyttet eller laget som en del av endefingeren eller polklemmen 19 finnes en fjærende holder 21 som tjener til å gripe om batteriets 15 sidedeler som vist. I samsvar med dette kan batteriet 15 lett festes løsbart til holderen 17 ved å plassere det samme mellom polklemmene 19, 20 og den tilknyttete holderen 21. Følgelig blir batteriet ved friksjon hindret i langsgående bevegelse av de fjærende polklemmene 19, 20 og i sidebevegelse av den fjærende holderen 21.

Passende ledninger 22, 23 forbinder batteriet med varmeelementet 12. Endene til den ene ledningen 23 er altså koplet mellom konstantanstrimlen 14 og batteriets polklemme 20. Den andre ledning eller kabel 23 er koplet til batteriets andre polklemme 19 og konstantanstrimlens 14 andre ende. Når motstandene er slik koplet, blir de knyttet til batteriet når batterier plasseres i holderen 17. Et passende bånd skjuler eller dekker over lederne 22, 23 inn mot sokkens leggdel.

Konstantanstrimlens 14 varmende overflate forøkes med en stråleinnretning som er varmeledende forbundet til denne. I oppfinnelsens viste form omfatter den varmestrålende innretningen en plate av varmeledende materiale, for eksempel metallfolie 25, det kan være aluminiumsfolie eller liknende, som er varmeledende for-

bundet med konstantanstrimlen 14. I det viste eksempel kan to like strimler 25, 25A plasseres flate mot flate på hver sin side av motstandselementet slik at de er varmeledende forbundet med denne og med hverandre. Et passende hjelpemiddel for å feste folien til motstanden 14 kan være å dekke baksiden av folien med et lag klebemiddel. Klebemiddel-laget vil følgelig også virke som elektrisk isolator mellom den elektriske motstanden og folien samtidig som den holder folien 25, 25A varmeledende festet til motstanden 14. Folien 25, 25A kan også isoleres elektrisk ved at den elektropletteres.

Som vist kan motstandens 14 varmende flate eller overflate utvides til enhver størrelse eller form avhengig av figur og form på de strålende strimlene 25, 25A. Varmen fra en spesielt tynn motstand kan således fordeles effektivt over en forholdsvis stor flate. Varmen som utvikles er følgelig ikke knyttet til et enkelt punkt, men blir lettvint fordelt slik at den gir jevn oppvarming.

I oppfinnelsens vist form kan det lett sees at varmeelementet 12 opprinnelig ble fremstilt som en utstrakt del som deretter ble brettet slik at den danner det U-formete varmeelement 12 som lettvint kan innsettes i sokkens 10 tålomme 13.

Det vil merkes når varmeelementet brukes at der tilføres strøm hver gang batteriet 15 blir innskutt mellom polklemmene 19, 20 på batteriholderen.

Dersom det ønskes kan en passende bryteranordning (ikke vist) koples inn i serie mellom batteriet 15 og varmeelementet 12 for å regulere driften av kretsen.

Ifølge den foreliggende oppfinnelse er det frembrakt en anordning for å forlenge batteriets levetid. Erfaring har vist at den temperatur som kreves utviklet fra varmeelementet bare trenger å være litt høyere enn vanlig kroppstemperatur for å holde føttene varme. Av denne grunn trenger ikke strømtilførselen til varmeelementet å være konstant. Av denne grunn kan varmekretsen drives intermittent som det måtte trenges for kroppstemperaturen eller som bæreren måtte fordre. Dette oppnås ved å skyte inn en automatisk virkende bryter 26 av kjent konstruksjon i ledningen mellom batteriet 15 og varmeelementet. Bryteren er følgelig konstruert slik at den vil virke som en termostat og gjøre driften intermittent og bryte kretsen til varmeelementet i samsvar med energibehovet. Ved å benytte intermittent drift ble det således oppdaget at batteriets 15 nyttbare levetid kan forlenges vesentlig.

Varmeelementet 12 som ble beskrevet, er plassert og konstruert slik at den kan drives av et ekstra lavspent batteri. Tre til fire 1½-volts elementer kan for eksempel benyttes til å drive varmeelementet 12, eller et 3-volts element kan gi en tilfredsstillende drift. To celle-elementer kan også benyttes til å drive varmeelementet 12.

Av det foregående vil lett sees at det oppvarmete fottøyet 10 som er beskrevet, omfatter en fullstendig sluttet enhet hvori kraftkilden 15 og varmeelementet 12 kan bli plassert fullstendig inni selve sokkens 10 oppbygning. Hele sokken 10 er forholdsvis lett i vekt og når den bæres, kan den bæres med samme bekvemmelighet og behag som en vanlig sokk. Bæreren må heller ikke bære en stor kraftforsyningsenhet som gjøres lett synlig for en annen person. Oppfinnelsen som beskrevet gir fottøyet et vanlig fottøys ytre og komfort, men med den forholdsregel i tillegg at den er forsynt med en varmekilde som kan gi ekstra komfort ved ekstrem kulde. Den oppvarmete sokken er selvfølgelig spesielt anvendelig som sportsplagg, for eksempel ved jakt og/eller fiske i kulde eller i kaldt klima, og den kan bæres slik at den på ingen måte forstyrrer bærerens bevegelser. Totalvekten av sokken er også redusert til et minimum.

PATENTKRAV

1. Sokk utformet i ett stykke med en tådel, en hældel og leggdel samt utstyrt med elektriske varmeorganer, hvilke varmeorganer omfatter et lavvolts elektrisk motstandselement (14) forbundet over en elektrisk strømkrets med en spenningskilde (15) på seks volt eller mindre, anbrakt i nærheten av sokkens leggdel (10C), k a r a k t e r i s e r t v e d at varmeorganet er plassert i sokkens tåparti og at en varmespredeflate (25, 25A) som er forbundet i varmeledende forbindelse med det udekkete elektriske motstandselement (14) har en ytterflate større enn det udekkete motstandselements ytterflate for å fordele varmen frembrakt av det elektriske motstandselement over et utvidet område.

2. Sokk i samsvar med krav 1, k a r a k t e r i s e r t v e d at spredeflaten (25, 25A) er elektrisk isolert fra varmeelementet (14).

3. Sokk i samsvar med krav 1 eller 2, k a r a k t e r i s e r t v e d at varmeelementet (14) består av en flat strimmel av elektrisk motstandsmateriale.

4. Sokk i samsvar med et av kravene 1 til 3, k a r a k t e - r i s e r t v e d at varmespredeflaten omfatter varmeledende strimler (25, 25A) plassert flate mot flate på hver sin side av varmeelementet (14).

5. Sokk i samsvar med et av kravene 1 til 4, k a r a k t e - r i s e r t v e d at varmespredeflaten omfatter på baksiden klebemiddelovertrukne metallfoliestrimler (25, 25A) som er festet til varmeelementet (14) ved hjelp av klebemidlet og at klebemidlet danner elektrisk isolasjon mellom foliestrimlen (25, 25A) og varmeelementet (14) uten å påvirke varmeledningsforholdet mellom disse vesentlig.

6. Sokk i samsvar med et av kravene 1 til 5, k a r a k t e - r i s e r t v e d at det er plassert en bryter (26) i varmeelementets krets for med mellomrom å slutte og bryte strømkretsen til varmeelementet.

7. Sokk i samsvar med et av kravene 1 til 6, k a r a k t e - r i s e r t v e d en lommedannende anordning (13A) utformet i sokkens tådel for opptakelse av varmeelementet (14) og den tilknyttete varmespredeflate (25, 25A) inne i tålommen (13).

Anførte publikasjoner:

U.S. patent nr. 3.079.486

Fig. 1

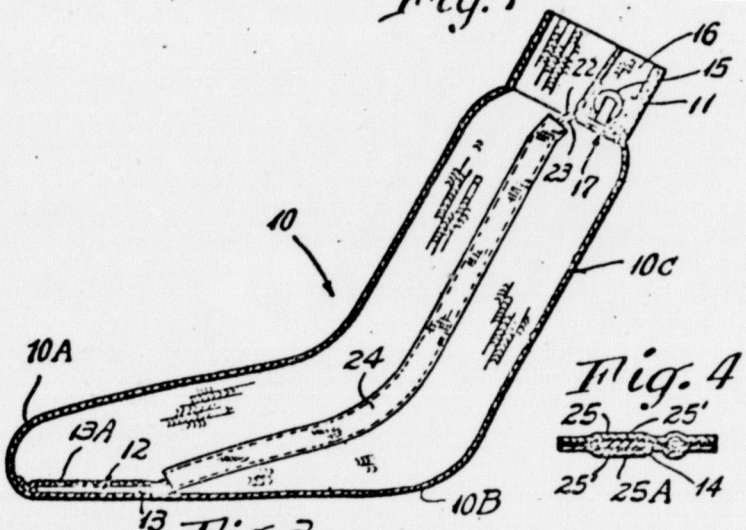
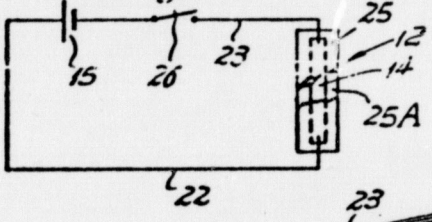


Fig. 4

Fig. 3



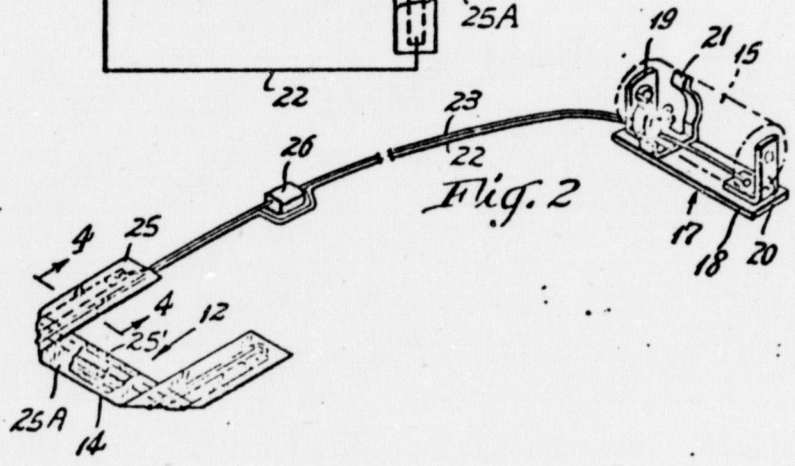


Fig. 2

Союз Советских Социалистических Республик

Комитет по делам изобретений и открытий при Совете Министров СССР

ОПИСАНИЕ ИЗОБРЕТЕНИЯ

К ПАТЕНТУ

226465

Зависимый от № —

Заявлено 29.XI.1966 (№ 1115138/28-12)

с присоединением заявки № —

Приоритет —

Опубликовано 05.IX.1968. Бюллетень № 28

Дата опубликования описания 9.I.1969

Кл. 3b, 13/06
21h, 2/03

МПК A 41d
H 05b

УДК 687.254.81-05
(088.8)

PLAINTIFF'S EXHIBIT
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обретения

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ВЯЗАНЫЙ ИЛИ КРОЕНЫЙ НОСОК

1

Известны вязаные или кроеные носки, снабженные карманом для размещения в нем средства электрообогрева носка.

Предлагаемый вязаный или кроеный носок ограничивает движения человека. Это достигается тем, что средство электрообогрева держит источник электроэнергии, размещенный в кармане напульсника носка, и грелку в виде ленты, например из нихрома, обклеенную с двух сторон фольгой. Грелка размещена в кармане мысочной части носка и соединена с источником электроэнергии электропроводами, проходящими по карману паголенной и следовой части носка.

На фиг. 1 изображен предлагаемый носок, разрез; на фиг. 2 — схема электрической це-

Носок *1* снабжен карманами *2, 3, 4* для размещения в нем средства электрообогрева, которое состоит из источника электроэнергии (например низковольтной батареи, размещенной в кармане *2* напульсника *6* носка, и грелки *7* в виде ленты *8*, например из нихрома, обклеенной с двух сторон алюминиевой фольгой. Грелка *7* размещена в кармане *4* мысочной части носка *1* и соединена с источником электроэнергии *5* электропроводами проходящими по карману *3* паголеночной и следовой части носка.

2

Карманы *2, 3* и *4* образованы путем пришивки к напульснику *6*, а также паголеночной и следовой части носка полос материала *10*.

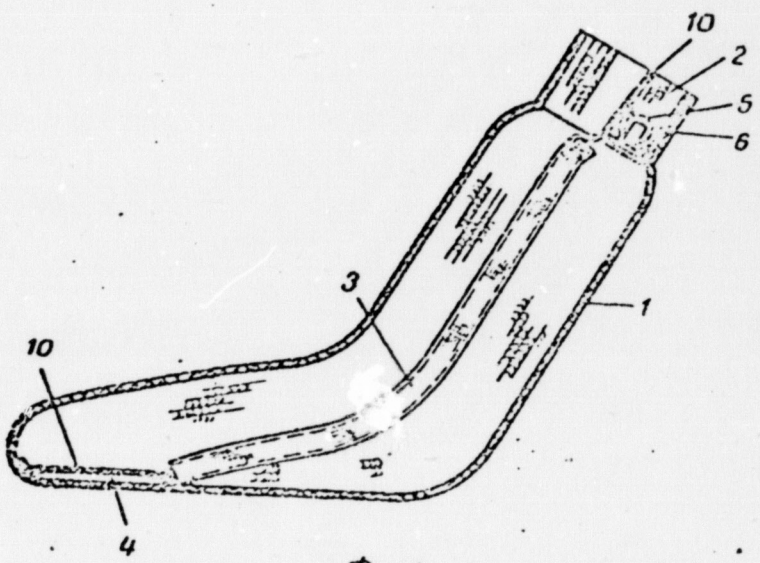
Размер кармана *2* выполнен таким, при котором он вмещает держатель батареи *11* с зажимами *12, 13* и скобой *14*. Концы одного электропровода *9* соединены с помощью зажима *12* с лентой *8*, имеющей сопротивление, а концы другого электропровода — с помощью зажима *13*. Обогревающую поверхность грелки *7* увеличивают за счет излучения, создаваемого более широкими полосками алюминиевой фольги *15* и *16*, которой обклеивается лента *8* с обеих сторон. Обратные стороны фольги соприкасаются с лентой *8*. Слой клея, служит электроизолирующим средством ленты от полосок фольги. Грелка *7* перегнута по форме мыска носка.

Чтобы согревать ноги человека, температура грелки должна быть незначительно выше температуры человеческого тела, а поэтому грелку можно периодически отключать при помощи выключателя *17* по желанию. Низковольтная батарея может быть трехвольтной.

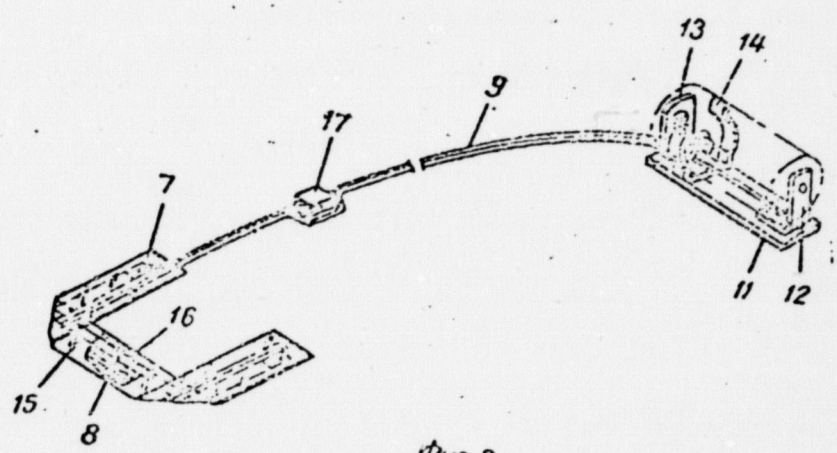
Предмет изобретения

Вязаный или кроеный носок, снабженный карманом для размещения в нем средства

электрообогрева носка, *отличающийся* тем, что упомянутое средство содержит источник электроэнергии, размещенный в кармане пальсника носка, и грелку в виде ленты, например из нихрома, обклеенную с двух сторон фольгой, причем грелка размещена в кармане мысочной части носка и соединена с источником электроэнергии электропроводами, проходящими по карману паголеночной и следовой части носка.



Фиг 1



Фиг.2

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